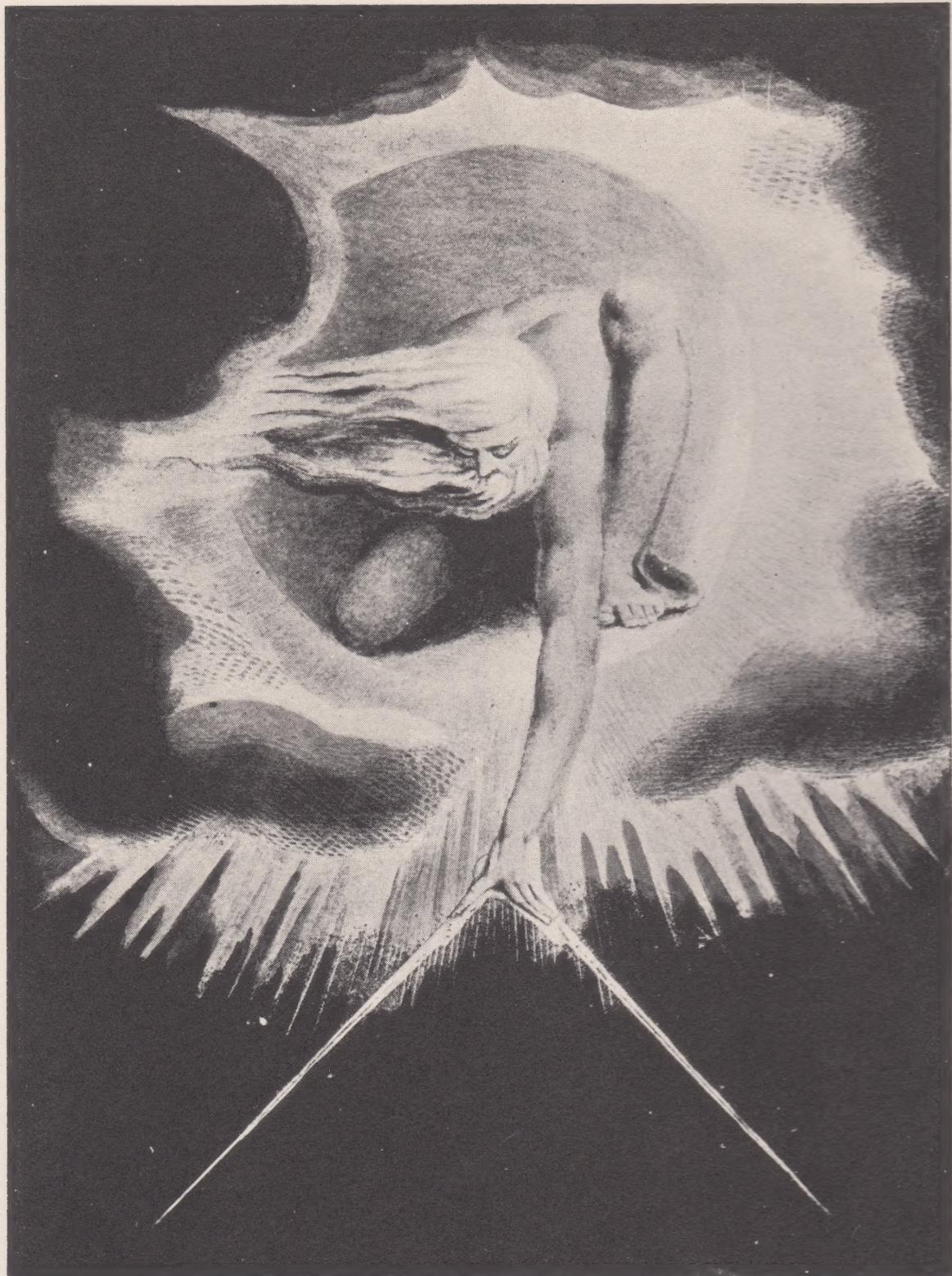


Imagination and Thinking



By permission of the British Museum

‘The Ancient of Days’, a vision recorded by William Blake.

Imagination and Thinking

A PSYCHOLOGICAL ANALYSIS

by

Peter McKellar

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PREFACE

THIS book is addressed to the reader—whether scientist, artist or layman—who is interested in the psychology of original and creative thinking. My endeavour has been to grapple constructively with the subject matter of thinking, whether it takes the form of reasoning or fantasy; and it has seemed fruitful to survey a broad range of psychological processes, both normal and abnormal. Particular attention has been given to those interactions of fantasy and reality-adjusted thinking which result in works of art or in fresh advances in science.

A major aim has been to describe the interesting diversity of forms which human thinking can take. Sir Francis Galton's pioneer investigations in the last century first uncovered wide variations of mental imagery and the rich variety of subjective experiences enjoyed by some people, although unknown to others; and it has seemed to me useful to attempt some further investigation in this field. A second major aim has been to examine certain mental processes (of which dreaming is the most obvious example) which may assist the normal person's appreciation of psychotic thinking and lead to more sympathetic understanding of 'the insane'—in the belief that a closer examination of the 'normal' may sometimes help to illuminate the 'abnormal'. Psychosis and its psychology have been approached not only through observation of patients, but also by investigation of the falling asleep, or hypnagogic, state and by observations made of volunteers who have taken mescaline or some other of the substances that can be used experimentally to produce temporary psychotic-like conditions. It is my firm belief that the main hope of achieving scientific understanding of psychotic illness, and a greater measure of sympathy with such patients' problems of adjustment, rests on the readiness of psychologists as research scientists, and of psychiatrists as medical specialists, to co-operate closely in joint investigations.

As has often been stressed in recent years, the theory of thinking is of central importance to scientific psychology. Since

scientific theorizing is itself a form of thinking, the psychologist's understanding of this process may be of material importance to the development of human science more generally. I have therefore not merely reported observations, but have also attempted some contributions of my own to the theory of thinking. Those thought products which we call scientific theories are not wholly unlike those we call works of architecture ; and since we lack the materials —that is, the knowledge—with which to build a finished theory of thinking, I have attempted rather to give at least a hint as to the possible outline of its scaffolding. In this work I have been heavily indebted to many previous investigators: pioneers like Holt and Silberer, more recent psychologists like Freud, Piaget and Thurstone, as well as contemporary theorists like Hebb.

It is a pleasure to acknowledge the encouragement of those who made this work possible. I am greatly indebted to Dr. James Watt (now at Liverpool University) and Mrs. Cairine Petrie of Aberdeen, who jointly provided the stimulus that led to its writing. Some of the researches reported would not have been possible without the closest co-operation of psychiatrist colleagues in the Aberdeen area: for such co-operation I am particularly indebted to Professor W. M. Millar, Dr. Adam Milne and their staffs. I also wish to thank the many patients on the other side of that 'pane of glass' said to divide the psychotic from what we are pleased to call 'sanity', who gave me the fullest possible help. It is a pleasure to record that some of these patients are now discharged from hospital and rehabilitated. The experiments with mescaline began in 1951 in association with Dr. Max Valentine and Dr. Stuart Boyd at Aberdeen Medical School. They were continued by a psychologist-psychiatrist research team whose contribution to this book merits special emphasis, namely Dr. J. A. Ardis, Mr. J. Drewery, Dr. Elizabeth Fraser and Mrs. Lorna Simpson.

I am much indebted to Professor Rex Knight, Mrs. Margaret Knight, Dr. D. E. Berlyne and Mr. J. King of the Psychology Department at Aberdeen University for numerous suggestions and criticisms. I have to thank Miss Enid Blyton for allowing me to quote extensively from a series of her letters to me, and Professor G. C. Drew, Dr. E. H. Gombrich, Emeritus Professor T. H. Pear and Dr. Hannah Steinberg for permission to include observations or introspections obtained by them. Finally I am indebted to

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*'The Ancient of Days' by William Blake is
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CHAPTER I

IMAGINATION, THINKING AND THE DREAM

There is no conception in a man's mind, which hath not at first, totally or by parts, been begotten upon the organs of sense.—

THOMAS HOBBES

THE psychology of human imagination and thinking must necessarily take into account certain mental processes not always regarded as 'thought'. Some of these are widely considered to be 'abnormal' or even 'supernatural' in origin. In this book we shall attempt to show that such mental processes, however strange, are highly relevant to the understanding of man's thinking. It will be argued that it is fruitful to regard human thinking as ranging from logical reasoning and scientific theorizing, through creative imagination, dreams and related experiences, to the hallucinations of psychosis or 'insanity'. Our analysis will begin with the dream, which may help our understanding of the huge variety of forms of thought and imagination.

In dreams all things are possible. Things 'just happen' in dreams, and happen in ways that violate the laws ordinarily controlling events. The dreamer himself seems prepared to accept without surprise or alarm deviations from these laws upon which, when awake, he confidently relies. Gravitational forces may cease to operate; infants may engage the dreamer in argument; he may fly like a bird; and people whom he knows to be dead may appear and talk to him. Schroetter (1911) experimentally induced a dream in a man who first proceeded to crawl through the eye of a needle and immediately afterwards to stride across the Danube. We may accept such violations of natural law *if* they occur to us during sleep. Moreover, we are not unduly surprised when we hear accounts of such 'experiences' from others, once we learn that they have happened in dreams.

Yet similar events occur in the *waking* life of some people. The poet and painter William Blake (1757-1827) 'took part' in numerous and apparently quite casual 'conversations' with the prophets Isaiah and Ezekiel, and seems to have accepted these

occurrences without alarm despite their violation of natural law. Again, an apparition was visible to Blake 'above the stairs' of his house for nearly a week before he decided to record it in his painting 'The Ancient of Days'. We learn, moreover, that William Blake's younger brother, Robert, 'went about the house after 1787 as he had done before, although it happened he died that year' (Bronowski 1944). Dream-life experiences resemble such occurrences, which psychological science would label as either 'hallucination' or 'eidetic imagery', in their disregard of the principles that govern material nature; and hence our dreams may well help us to understand Blake's poems and pictures. In the same way, it is in terms of his own personal subjective experiences—dreams, nightmares and the like—that the normal person has his best chance of understanding the insane or psychotic patient and of achieving a measure of sympathy with his problems of adjustment.

In the words of the psychologist Wundt, 'we ourselves, in fact, can experience in dreams almost all the phenomena to be met with in insane asylums'. In 1764 Immanuel Kant declared that 'the madman is a waking dreamer', while a century later Schopenhauer described dreams as brief madness and likened madness to a long dream. In recent times Jung has reiterated this view by likening the psychotic (of the schizophrenic type) to 'a sleeping person in a waking world'. Resemblances between sleep and psychosis will be considered elsewhere in this book, which will be very much concerned with experiences running counter to sanity and normal wakefulness.

Our personal acquaintance with dreams and their 'all-things-are-possible' quality may also help us to understand the curious things some people claim to have 'experienced'; for the dream has always provided a rich source of material for human imagining to build on. Thomas Hobbes in the seventeenth century was far in advance of the superstitious age in which he lived in his awareness of the contribution of dreaming to folklore. He wrote: 'From this ignorance of how to distinguish dreams and other strong fancies from vision and sense, did arise the greatest part of the religion of the Gentiles in time past, that worshipped satyrs, fawnes, nymphs, and the like.' In this way he sought also to explain the origins of belief in fairies, ghosts and goblins, and in the power of witches. In modern times such anthropologists as Tylor have derived myth, folklore and primitive religion principally from the

dream. And to the dream may be added the nightmare, from which the psycho-analyst Ernest Jones derives vampires, incubi and other of the darker products of imaginative thought. While we would not wish to endorse without qualifications (which will emerge later) this theory of the origins of folklore, we may examine some of its implications.

As we have seen, dreaming enables human beings to extend their 'experiences' beyond the realm of physical possibility. Moreover, dream-life and real happenings are sometimes so blended together in reports of 'events' as to defy naturalistic explanation until the two separate components are parcelled out. As an illustration we may take the Witches' Sabbat of earlier times. There seems to be a hard core of fact; things happened, round which a great deal of fantasy developed. But if witches did meet and did take part in Sabbats, most of us today have sufficient confidence in natural law to reject the belief, formerly widely held, that they flew to them on broomsticks. Hallucination may have contributed to the ideas prompting belief in this and other impossible or improbable features of the Sabbat. Moreover, there are instances of witches who stayed at home but dreamed that they had flown through the air to a Sabbat; for people are perfectly capable of flight in their dreams. Reports survive of 'witches lying rigidly in their trances, insensible to pain. When they awoke they related their flying experiences and talked of the meals they had shared with their companions at the gatherings.' (Seligman 1948, p. 248.) As the writer adds, there is no reason to doubt that Sabbats did occur and were attended by witches in person, 'even though they had to go on foot'.

But there are conditions other than dream or trance that permit imaginative experience of flight: for instance, the falling asleep or 'hypnagogic' state. (See Chapter II.) A case of hypnagogic flying is described by Professor Newbold who, while falling asleep, quite frequently experienced 'flying, face downwards, about 20 feet above the ground. It is always night and I am following a road, trees, fences, fields dimly seen along the roadside.' (Leaning *et al.* 1925, p. 151.) It is not difficult to guess the sort of interpretation that, in a witchcraft-ridden age, might readily be placed upon a hypnagogic experience of this kind. Hypnagogic imagery is by no means uncommon and may have contributed, along with dreams, to the content of folklore and helped to reinforce superstitious

beliefs already held. The reported 'successes' of malevolent witchcraft require other kinds of explanation, and some of these are not hard to find. For example, the genuine witch seems to have been perfectly willing to use dependable naturalistic means such as poisoning when supernatural methods failed.

Today we have some—though perhaps not enough—confidence in the scientific type of explanation. We can apply tested human knowledge of the principles which govern material nature on the one hand, and human behaviour on the other. In seeking to explain reports of impossible events it is necessary to take account of the principles governing human testimony, the processes which select what we perceive, remember and subsequently report. Also relevant to such explanations are those subjective experiences that we propose to call 'imagination experiences', namely dreams, nightmares, hallucinations, hypnagogic images and other such phenomena. We shall consider the nature of these imagination experiences, which have been investigated in the forms they assume among contemporary human beings. Many seemingly 'supernatural' events can be naturalistically explained by their means without departing from the laws of physical and psychological science.

A-THINKING AND R-THINKING

The word 'thinking' is frequently confined, both in technical and lay discussions, to processes of the reasoning, logical and reality-adjusted type; but in the present study these will be regarded as only *one* of *two* kinds of thinking. The second kind—or other end of the scale of thinking—is represented by dreaming, waking fantasy, the occurrences that sometimes accompany falling asleep and waking up, hallucination, and certain other phenomena that are prominent in psychosis. This antithesis between reality-adjusted thinking on the one hand and fantasy-dominated thinking on the other has often been made. Bleuler (1911) uses the term 'autism' to denote the relative or absolute dominance of the inner, fantasy life. Autism is defined by Warren's *Dictionary of Psychology* as 'a type of thinking dominated by subjective trends, the material being uncorrected in its essential features by objective standards, e.g. day dreams'.

We must therefore distinguish between what will be called 'R-thinking' (reality-adjusted thinking) on the one hand, and 'A-thinking' (autism) on the other. R-thinking characterizes sanity and ~~waking~~ consciousness in their more logical, realistic and prejudice-free moments. Crawshay-Williams (1947, p. 7) provides a useful definition of these processes as 'thinking specially adapted to the specific purpose of enabling us to deal successfully with the objective world and its phenomena, by forming correct opinions about these phenomena and about their causes and effects'. By contrast, A-thinking is characteristic of sleep and the hypnagogic state rather than waking consciousness; it is dependent upon mere association of ideas rather than upon logical connection and testing against reality. A-thinking is subject to intrusions of fantasy rather than to correction by accurate perceptual observation.¹

It is necessary and important to distinguish thus and not merely between 'normal' and 'abnormal' or 'pathological' thinking. We have seen that under normal circumstances such as being asleep or in the act of falling asleep the non-psychotic may experience typically A-thinking processes. Conversely, R-thinking may play a quite substantial part in the mental life of the grossly abnormal or in psychotic individual. There has perhaps been too little awareness by the normal person—naturally enough anxious to dissociate himself and his own mental life from 'the insane'—that a good deal of a psychotic's thinking may be of a reality-adjusted kind; and it will be part of our task to question such stereotypes about 'insanity' and 'madness' as are widely prevalent even today.² These stereotypes themselves are instances of A-thinking on the part of non-psychotics, and will be examined critically in the interests of serious scientific understanding of the subject matter of thinking. Even the sophisticated notion of 'loss of

¹A distinction between two such types of psychological functioning is compatible with a concept which derives from neurology and has become influential in German psychological theory: namely that newer and more complex neurological structures grow as superimpositions upon older and more primitive structures, which nevertheless continue to function. Cf. Bracken, 1952.

²It is interesting to note how the popular stereotype of the psychotic differs from that of the neurotic, who is often viewed with a kind of superior hostility as a malingerer. Widespread notions about psychotics are no less inaccurate, but it is fear rather than hostility which tends to be their accompanying emotion.

'insight' as a distinguishing characteristic of the psychotic (as contrasted with the neurotic) is by no means invariably appropriate. On the contrary, we are heavily indebted to the insight of individual psychotic patients for much of our understanding of the nature of psychotic thinking.

The distinction between A-thinking and R-thinking, and a psychotic's intermittent ability to recognize the difference, are both well illustrated by the account of his subjective experiences given to an interviewer by a severely deluded but highly intelligent schizophrenic. 'I've seen and heard people speak when they never spoke a word. I don't know what to be sure of, and what not. I know when I'm speaking myself, but I don't know when other people are answering me.' These words show insight into the occurrence of visual and auditory hallucination, insight of a sort that it would obviously be difficult to retain all the time and apply in every situation. The patient's account might well be described as an application of R-thinking to a subject matter of an A-thinking kind, an attempt to explain his difficulty in behaving normally among other people. To put it another way, the statement is an attempt to use the residue of reality-adjusted thought processes to deal with the hallucinatory, A-thinking processes that have invaded waking consciousness.

A patient early in his psychotic illness may be puzzled and frightened by hallucination and related occurrences. Although these are part of his own mental life he has no control over their occurrence and content. An early schizophrenic and a severely ill psychotic may both make strenuous attempts to muster their remaining resources of R-thinking; and to some extent they may retain the ability to distinguish hallucination and other manifestations of A-thinking from real external events. These attempts to retain the balance between R-thinking and A-thinking should not be too difficult for the normal man to empathize with and understand—especially if he remembers his own dreams and nightmares. For dreams, as we have said, provide one valuable clue to psychotic thinking. We shall now examine the dream in its relevance to the psychology of thinking more generally.

Sigmund Freud regarded *The Interpretation of Dreams* (1900) as his most important book. In later years he was to write: 'It contains, even according to my present-day judgment, the most valuable of all the discoveries it has been my good fortune to

make. Insight such as this falls to one's lot but once in a lifetime.' (Foreword to 3rd edn., 1932.) Freud's book deals principally with one type of A-thinking, the dream, but also to a lesser extent with the waking fantasy—both examined from the standpoint of Freud's single central theory. This theory, although confined to thinking of the fantasy type, presents an interesting possibility for those who seek an adequate theory (which we lack) of thinking more generally. Could Freud's theory of the dream provide some basis from which to approach thinking as such, with the dream (and waking fantasy) regarded merely as a special case? If this were so, then an extension of Freud's theory might provide a helpful theoretical advance in a field of psychology where unifying theory is much needed.

It was Freud's contention that the dream is a wish-fulfilment. Its *motive* is a wish, its *content* the fulfilment of a wish. Children's dreams tend to be simple wish-fulfilments, while those of adult life tend to be disguised wish-fulfilments. Underlying the apparent or 'manifest' content of adult dreams is a 'latent' content, which it is the task of psychological analysis to uncover by a process of free association. Freud attributed the discrepancy between the manifest and latent content to the influence of various distorting and disguising 'dream mechanisms' which hide the dreamer's real motives from himself and others. Some later theorists, notably Rivers (1923), have rejected this dream-mechanism theory. They have emphasized instead the regressive character of the dream, and have regarded the manifest content as a result of the fact that in dreams thinking operates at a lower and more primitive level of mental functioning.

In interpreting the dream as a wish-fulfilment Freud is noticing that dreams are motivated, and is emphasizing this motivational aspect. He argues that we can learn a great deal about a given person's motives, emotional preoccupations and personality from a study of his dreams. Conversely, a knowledge of the motives that activate a given personality and distinguish it from other personalities contributes a great deal to the understanding of why a given dream is so and not otherwise.¹

¹Elsewhere we have noted that in this awareness of the continuity of all mental life, and thus of the importance of dreams, Freud had a predecessor in the Russian novelist, Dostoevsky. This insight is particularly apparent in the part that dreams play in the plot of *Crime and Punishment*. (See McKellar 1952, pp. 230 f.)

Freud was concerned to uncover the motivation of dreams in its full complexity, and he characteristically refused to let his curiosity rest when he had merely found the more obvious of the operating motives. His instances of dream analysis might thus be viewed as a process of uncovering the less obvious aspects of the motivation underlying specific dreams.¹ Alternatively, they might be viewed from a somewhat different standpoint as a process of locating the various elements of content of the dream among events in the dreamer's past life. Although Freud admits that a given dream may 'select its material from any period of life,' he follows Robert Strümpell, Hildebrandt and others in placing particular emphasis on recent perceptual experience—especially that of the previous day—as the principal source of such content. The motives involved in the dream may thus be viewed as principles governing the selection, from among other past impressions, of those that form the content of the dream.

Dreams and waking fantasies are only two of the many different kinds of thought product which may be examined in terms of (a) motivation, and (b) content. Bearing in mind the possibility we have suggested, that Freud's theory of the dream may provide a basis for a theory of thinking more generally, we shall consider from this same standpoint of motive and content another type of thought product—the exposition of a point of view in a conversation or a speech. Let us take this example:

My wish is to expound and defend the view that in a modern democracy there tends to be an excessive concentration of power in the hands of a few people, namely the Cabinet. I wish to develop this argument, that what we call 'democracy' sometimes manifests certain of the less satisfactory features of 'oligarchy'. Even in *stating* the argument as briefly as this, I find that my thought product is influenced by, and is making use of, a wide range of perceptual experiences which together make up its content. A selection has taken place, no less than in a dream, from numerous ideas acquired at different periods of my life by sense perception—what I have seen, heard or otherwise perceived. The past perceptions chosen

¹To avoid any misunderstanding: we are not concerned to maintain that dreams are invariably of the wish fulfilment kind, in some narrow sense of the word 'wish' (a view which Freud did not himself hold in any case). Our interest is in Freud's acute awareness of continuity between sleeping mental life and the personality, life history and motives of the dreamer.

are those which seem to me appropriate to the expression of the dominant motive, namely the wish to expound my point of view and condemn what I dislike.

Let us now examine the *motivation* of my choice of this example, rather than some other, to illustrate my thesis.¹ Even momentary introspection reveals that the content of this thought product is influenced by Plato's writings about the two forms of government, democracy and oligarchy. The next association that occurs is my memory of the psychologist Spearman's attempt to classify different theories of intelligence by analogy with monarchy, oligarchy and democracy. From this follows the idea that my own thinking in this respect resembles that of the earlier psychologist. Spearman was using a political analogy to make a psychological point, and I am doing something similar. At this point motivational and emotional processes (compare Freud's 'latent content') begin to be prominent. Just as in the analysis of dreams association may soon lead to emotionally charged ideas which the dreamer would rather not admit, at least not publicly, so I feel on further introspection that in drawing a parallel between Spearman's thinking and my own I am experiencing discomfort derived from admiration of his work. Then a second emotionally charged association emerges, for I have chosen a quasi-political opinion that I hold, and that I would like the reader to accept along with my analysis of the purely psychological theory. An element of unjustifiable propaganda has been disclosed. I am aware of stating my opinion on a political issue irrelevant to the psychological problem involved, and have the further thought that as I proceed my motives will be 'mixed' and will include a wish to defend the opinion as such.

The example taken has already begun to show some interesting resemblances between the dream and this different type of thought product. It soon becomes apparent that prudence and caution will exert their censorship upon too complete an analysis of either. Quite soon emotional discomfort and other irrational influences may be experienced; they are noticeable even despite my intellectual knowledge that the influence of such irrational motives is more or less universal.

¹Freud's view would be that the choice of an example is not a matter of chance, but must inevitably be the result of unconscious motives—of one sort or another—like those to which attention is drawn. (Freud 1904; see especially Chapter XII.)

Leaving the motivation of this thought product, let us make an examination of its *content*. Let us consider the defence of this actual political opinion that might be attempted in an argument or, let us say, in a public speech:

I decide to refer to a newspaper report of statements made by a peer who defended a similar point of view in the House of Lords; this I read *several years ago*. Again, I tell an amusing anecdote about some local events revealing the absurdity that can result from excessive centralization of authority; this story was told me by a friend *three weeks ago*. Again, I recall and quote from an article I wrote in 1951, which dealt with the self-deceptive processes operating in Nazi Germany under conditions of excessive centralization of power. Yet again I recall as relevant an incident mentioned by Wallas (1936) in which members of a former Cabinet at one end of the table were unaware of important decisions being made at the other end; this I remember having last read *some months ago*. The selection of content for my speech will be determined not only by conscious recall, but also by forgotten events that have impressed me and contributed to my opinion and the form it has assumed.

It will be seen in the above instance how in this other kind of thought product numerous components, rational and irrational, conscious and unconscious, together contribute to its *content*; and how, as in a dream, all have a common *motivational* link. This motivation, while itself complex, will obviously include as a major item the wish (or conscious intention) to express the opinion as coherently and as convincingly as possible. The way in which motivational factors select from past experience in the case of dreams has been likened by Ella Sharpe (1937) to the way in which a magnet, drawn across a hundred small objects on a table, will select the metal ones. Thus, she writes, the wish in the dream 'will gather together out of the whole reservoir of past and present experiences just those particular ones that are responsive to the "magnet".' It is contended that a similar relation between motive and past experience applies to such a thought product as the exposition of an argument.

In the instance we have been discussing there are further resemblances to the dream. Whatever associative processes operate, the ideas making up the content of such a thought product, no less than those making up a dream, will be subject to censorship. In this instance the censorship will take the form of rejection of

anything irrelevant, intellectually unsound, libellous, or in some other way inexpedient to say in a speech or write in a book. If the source material is from a sufficiently diverse number of original perceptual sources, it may be a task of some difficulty for the thinker himself to locate them. And as in the case of a dream, it may be an impossible task for anyone else to accomplish without the presence of the thinker himself and his free associations to the items of content of his thought product.

It would appear from this analysis of a speech that such a thought product, like a dream, derives its content exclusively from perceptual experience. If we accept Hobbes's hypothesis that every conception in a man's mind has been 'begotten upon the organs of sense', then no other source of subject matter for thought is possible: all thought—however creative—must have an initial external source. Freud's analysis of dreams affords abundant evidence of how the fantasies of sleep, however surprising and seemingly original their content, originate in this way. The implications of this standpoint, if applied to human thought in general, are far-reaching. Not merely man's dreams, but his most unrestrained imaginings, his original inventions and ideas, and those thought products we call works of art and science, all derive from recent and/or remote perceptions.

This fact is readily apparent in remembering and recollection. It is less obvious in thought products showing originality, and least obvious in impressively unproductive achievements of the human imagination. And if the principle holds in these cases also, then originality itself presents a curious and interesting problem for psychological analysis to explain. Important in this process is perception of the thoughts and imaginings of others. Imagination is cumulative and, as Gombrich (1951) remarks in the case of visual art, 'all pictures owe more to other pictures than they do to nature'. Yet thought products are not unoriginal because of this cumulative nature of imagination, nor because of the perceptual origin of their content. Originality can arise from the connection, rearrangement, and fusion of perceptions.

The phenomenon of 'unconscious plagiarism' provides a suggestive link between those thought products we call 'reproductive' and those we call 'creative'. For when unconscious plagiarism occurs, the thinker appropriates somebody else's ideas without any awareness of having done so; and the occurrence shares with

creative thinking the *appearance* of having no reference to perception—of seeming to come from 'within' rather than from 'outside.' Thought products might be envisaged as ranging between the two extremes of the highly original and the highly unoriginal; and it has been suggested elsewhere (McKellar 1952, pp. 188 f.) that, provided the word is shorn of any quality of adverse moral judgment, both extremes of such a scale might well be described as 'plagiaristic'.

This view may be illustrated from some prosaic instances of originality—university students' essays and examination papers. These are assessed and marked, in practice, on a scale ranging from 'very poor' to 'exceptionally good'. The distinguishing feature of papers likely to be assessed as 'poor' presents little interest, and can be dismissed in terms of the principles that govern forgetting and misremembering after inadequate learning. Another sort of paper likely to receive an indifferent mark is more interesting: it comprises the fruits of often quite remarkable rote remembering by a diligent but unimaginative plodder, gleaned from his textbook, lecture notes or other single source. Such reproductive work, so far as it does deviate from its sources, will deviate in predictable and well understood ways which have been studied in the classical experiments of Bartlett (1932) and have been related to Gestalt theory by Wulf and Koffka (Koffka 1935). One interesting tendency that emerges from these repeated reproduction (and serial reproduction) experiments in the psychological laboratory is a bias towards the concrete.¹ In the same way, the student tends to remember and repeat concrete examples, while forgetting and omitting the abstract principles which such examples illustrate.

Papers of this indifferent type may be contrasted with those likely to be assessed as 'good' or those of an advanced rather than elementary student. The better type of paper will stand out by its tendency to bring together items of content from several different sources: a principle learned from a textbook, a diagram from an article, an observation made during a laboratory experiment, and perhaps a brief reference to an investigation read about in some other textbook or reported in a lecture. In the good and 'original'

¹'Concretization' of somewhat similar kind occurs elsewhere, e.g. in the hypnagogic state (see Chapter III) and in psychosis (see Chapter VII).

paper these separate items will not be merely joined, but rather fused into integrated wholes that are appropriate answers to the questions.

There are many other differences between original and less original thought, some of which we shall consider in later chapters; but we may mention here one more criterion of originality, stated in terms of associationist psychology. That is, that we tend to judge as original those thought products whose constituent associations are mainly those of similarity rather than of mere contiguity. Finally, the *motivation* of an examination answer—like that of a dream, a waking fantasy, or the exposition of a point of view—will be complex; though it will, of course, show dominant features such as the wish or conscious intention to answer the question asked and write about it relevantly.

Poems and other works of art are sometimes described as 'arising from the unconscious'. This does not mean that they arise in any magical way from some inner source of knowledge. 'The unconscious', if we choose to use such a term, is just as much formed from past perception as any other source of knowledge. It simply comprises what has been 'forgotten', what a man does not *know* he knows, as opposed to what he remembers, can recall, and knows he knows. Freud investigated 'the unconscious', and his studies revealed the dream as being a rearrangement of material derived from past perception and selected by a dominant motive. As we have seen, his analysis of dreams may be regarded as a process of explaining their content by reference to the life history of the dreamer.

Rivers has drawn attention to the resemblance between dreams and poems in terms of such analysis. 'It is possible', he suggested, 'to take the images of the manifest content of a poem and discover more or less exactly how each has been suggested by the experience, new or old, of the poet.'¹ The most detailed examination of poetry from this standpoint was that conducted by Livingstone Lowes, who set himself the task of tracing the perceptual origins of the content of Coleridge's two poems, *The Ancient Mariner* and *Kubla Khan*. The conception of creative thinking on which Lowes based his study may be stated in his own words: 'The imagination never operates in a vacuum. Its stuff is

¹Rivers 1923, p. 148. He also noted resemblances between the dream and another kind of thought product, the myth.

always fact of some order, somehow experienced; its product is that fact transmuted.' (Lowes 1927, p. 427.) His method was to familiarize himself in an extremely systematic way with everything there was reason to believe Coleridge had read just before writing the poems. An incidental discovery was that, whatever might be the perceptual origins of the content of Coleridge's third great poem, *Christabel*, they were different from those of the two poems studied.

For *The Ancient Mariner* Lowes worked through accounts of early voyages of discovery such as those of Cook and Dampier, supplemented by a notebook that Coleridge kept at this period.¹ It cannot be assumed that even so painstaking an investigation as this would have traced all the reading and other perceptual material that influenced the structure of the poem. Nevertheless, Lowes went a very long way indeed to discovering a sufficient reason why the poem assumed the form it did and not another form. He did not, of course, hold that Coleridge composed by a process of conscious synthesis from his reading; his implication is rather that an unconscious combining and rearrangement was involved in the creation of these two thought products, though conscious synthesis did play a part in some of Coleridge's lesser poems. In the case of *The Ancient Mariner* and *Kubla Khan*, as we have argued elsewhere

Without conscious volition the various relevant material read about early voyages of exploration and scientific phenomena, or perceived by Coleridge in his daily life, formed organizations in the poet's mind. Later under the influence of the censorship and selection of poetic technique and purpose, the final art product emerged. This was a gestalt, an integrated whole, continuous in its structure and spontaneous in its general content.²

Among those who have been impressed by resemblances between works of art and dreams some of the more cautious have reiterated Freud's own sober advice against indiscriminate speculation about symbols. The first essential, if one proposes to analyse a dream, is the presence of the dreamer so that one may obtain his associations with the various items of the dream's

¹Some evidence was found that the original 'Ancient Mariner' may well have been Fletcher Christian after the mutiny of the *Bounty*, for Coleridge had recorded his intention to write a poem on this theme.

²McKellar 1952, pp. 192-3.

content. Freud's technique of dream analysis has often been misunderstood. He was quite explicit in rejecting the arbitrary method of treating a dream as 'a kind of secret code in which every sign is translated into another sign of known meaning, according to an established key' (Freud 1900, p. 106). A responsible psychoanalyst does *not* listen to an account of a dream from his patient and then sit back and 'interpret' it. He waits for the associations of the dreamer, and it is these associations which tell him to what the various items of the dream's content relate in the dreamer's mental make-up. Freud again reiterated this essential part of free association when the surrealist André Breton asked him to contribute to an anthology of dreams. 'A mere collection of dreams', Freud replied, 'without the dreamer's associations, without knowledge of the circumstances in which they occurred, tells me nothing and I can hardly imagine what it could tell anyone.' (Quoted Gombrich 1954, p. 2.)

Great works of art thus present obvious difficulty for analysis by the technique that Freud applied to dreams. As Gombrich, speaking as an art historian to an audience of psychoanalysts, has pointed out, 'we historians just cannot raise the dead and put them on your couch'. He regards as unprofitable enterprises 'such attempts as have been made . . . to tiptoe across the centuries on a fragile rope made up of stray information'. On the other hand, other more fruitful studies have been conducted, and the difficulties can be partly or completely offset in a number of ways. The work of Gombrich himself merits mention, since it is grounded in a profound understanding not only of psychoanalysis but also of the psychology of perception. In Livingstone Lowes's case this free association problem was partially overcome by his having access to the notebook kept by Coleridge at the time he wrote the two poems.

PSYCHOSES

When we turn to insanity we find that the various phenomena which make up a given psychosis must also, and no less than those which make up a dream or a work of art, draw their content from experiences perceptually available to the individual concerned. Delusions, as Spearman (1930) has pointed out, depend on cultural factors for their content; and we might add that this is also true of hallucinations. Thus a modern psychotic might have

delusions about 'inter-communication apparatus' rather than about the rats and other vermin that often formed the content of delusions in an earlier, less technical, and less hygienic age. (See also p. 76.)

As we have seen, certain phenomena of psychosis have a dreamlike quality. In a *typical* dream the dreamer has no control over the content of the experience, or over what is going to 'happen' next. Yet the dream is a product of his own mental life; its content derives from selection by his own motives from his own past experiences. A great deal of psychotic behaviour can best be understood as response to an invasion of consciousness by A-thinking processes very much like those that occur in normal dreams. The patient is either overwhelmed by these, or he attempts to explain them by developing a more or less integrated system of rationalizations and delusions. Psychotic delusions and dreams have this further interesting resemblance, that both carry with them the impression of the authenticity of the fictitious events that they embody. Havelock Ellis (1911) remarked: 'Dreams are true while they last. Can we say more of life?' It is through this shared life of imaginary happenings that the normal man can best understand the mental processes of the psychotic whom, as dreamer, he so closely resembles.

The content of some psychoses appears to be similar to the classical wish fulfilment type of dream to which Freud drew attention. For instance, one schizophrenic reacted with no little resentment to the psychiatrist's attempts to cure her, because he was taking away what she described as her 'dream world'. In the course of therapy she declared: 'You've wakened me up now . . . I don't want to come back, but I'm half-way back.' Other types of psychotic experience, on the contrary, resemble the nightmare or the anxiety dream which Freud explicitly mentions and on which Rivers (1923) placed emphasis. One psychotic explained to the writer that his 'voices' never said anything pleasant to him. His hallucinations seemed to resemble nagging and threatening interruptions of a kind any normal person would certainly find irritating. In another case an hallucinatory voice was 'heard' by the patient interrupting the investigator's questions and threatening ill treatment to a close relation of the patient if she did not attend and try to answer the questions properly. Yet this nightmare type of hallucination did not persist all the time, for the same patient had, only a few minutes earlier,

been experiencing other hallucinations of a wholly pleasing kind. Thus some patients may experience alternately hallucinations resembling wish-fulfilment dreams and hallucinations resembling nightmares. The patient is, of course, no more able to control the content of his experiences than is the normal man to control his dreams and nightmares. These two types of dreams should be borne in mind, since they typify a basic distinction which seems to apply to various other A-thinking processes.

A further resemblance between hallucinations and dreams may be noted in conclusion. In the traditional view, hallucination is distinguishable from perception, in that it involves an absence of objective sensory stimulation. This view may be questioned. William James (1892) among others argued that 'this supposed absence of objective stimuli is a mistake'. Without necessarily accepting the theory that *all* hallucinations are misperceptions of actual sense data, we may note that real sense data can and do play a part in producing them. According to what has been called the 'principle of economy' in perception, such sense data as are present may evoke hallucinatory misperceptions, or may determine the content of hallucination. For example, breathing and other sounds sometimes provide a basis for auditory hallucinations; while the relation between visual hallucination and sensory cues will be considered more fully later. (See p. 80.) Dreams are like hallucinations in this relation to sensory cues, since it is not correct to say that we do not perceive when asleep. A dreamer may respond to a noise not by waking up, but rather by using the sound as subject matter in his dream and continuing to sleep. Freud and others have argued that the dreaming consciousness tends to respond in this way to noise, thirst, tactile and other stimuli, and by this process protect sleep from interruption.

In this chapter a distinction has been made between two principal types of human thinking: A-thinking and R-thinking. We have seen that dreams and hallucinations resemble each other in certain ways and represent typical instances of A-thinking. It has been suggested that it is in terms of his own sleeping thought—the dream and the nightmare—that a normal man is most likely to achieve some measure of understanding of those A-thinking processes to which the psychotic has to adjust himself. R-thinking in its various forms will be examined later, when we shall be concerned with those methods of reality-testing that

characterize science, and also with the subtle interactions between A-thinking and R-thinking upon which art, science and literature depend.

We have in particular been concerned with one form of A-thinking, the dream. Since no adequate overall theory of human thinking in general is available, we have suggested that Freud's theory of the dream may provide a point of departure for formulating such a theory. Freud's theory lays emphasis on one type of thought product and stresses two aspects of it, namely motivation and content. We have contended that any human thought product may, with profit, be examined from these two aspects, as being a selection of past perceptual experiences governed by dominant motivational factors. With this possibility in mind, therefore, we have considered two other kinds of thought product—the exposition of a point of view, and Coleridge's poems as studied and explained by Livingstone Lowes; and we have found, as the result of our examination, that aspects of Freud's theory have wider application to thought products more generally.

CHAPTER II

MENTAL IMAGERY

Phenomena are best understood when placed with their series, studied in their germ and in their over-ripe decay, and compared with their exaggerated and degenerate kindred.—WILLIAM JAMES.

WHEN someone starts to think or to imagine, his subject matter is not confined to what is perceptually present to him. He may also respond to what the psychologist Clark Hull has called 'the not here and the not now'. He may, for instance, recollect, and for many people recollection depends heavily on mental imagery. When I look at the typewriter before me what I experience is a percept; but when I close my eyes and *recollect* its appearance my experience is an image of the visual kind. Images corresponding to each of the principal sense modes are recorded. Galton (1904) found it helpful to classify people into the categories of 'visile', 'audile' and 'motile' according to their dominant imagery.

Mental imagery appears to vary in vividness, in the dominance of one or other of the sense modes, and in almost every other conceivable way. The influence of these wide individual variations must be recognized and at every point discounted, for the nature of one's own imagery may be such as to introduce into one's thinking a subtle personal parochialism that can seriously impede adequate communication. As Pear has put it, 'some people write as if everybody is either a visile or ought to be!' In judgments of the originality of thought imagery differences may again be important. The author of a thought product is one person, the critic who assesses it as 'original' another. If the critic's ways of imaging differ markedly from the thinker's, he may find the products of the latter's imagery 'original', or even incredible, viewing them as he does from the standpoint of his own image life.

To illustrate the wide individual variations in mental imagery we shall take the introspective reports of several leading British psychologists. Professor Sir Cyril Burt, commenting on the vividness of his own auditory imagery and the poverty of his visualizing, writes: 'Your mind may be like a silent cinema; mine is more like a broadcast debate, with the voices of conscience, my friends

and myself, all arguing together in the twilight.'¹ In contrast Professor Pear reports vivid visual imagery, but adds: 'My world of memory is nearly always silent.'² His visual imagery is so strong that he can visualize (even to the extent of being able to 'read') the imaged page of a newspaper and, if the newspaper is well known to him, 'in the characteristic type, even on the special paper' (personal communication, 1953). Elsewhere he comments on the fact that he experiences only occasional kinaesthetic images, adding: 'These transient glories of kinaesthesia thrown towards me are perhaps the staple diet of some big, hulking motile!'³

Visual imagery may be almost wholly unknown in the mental life of some individuals. Thus Professor Drew reports: 'I think I have visual dreams but am not really sure of this. In waking life I have only once been conscious of having a true visual image. . . . Deliberate attempts to induce such images have always been unsuccessful. I am quite unable to describe the appearance of anyone I have just left, unless when with him I have verbalised a description.' (Personal communication, 1954.) He adds: 'My thinking and remembering are normally verbal, and my imagery kinaesthetic, olfactory and, to a lesser extent, auditory. . . . Directions especially are symbolised for me by sensations of movement in the appropriate shoulder.'

The image life, or lack of it, of the late Dr. W. H. R. Rivers has many features of interest. 'I am one of those persons whose normal waking life is almost wholly free from sensory imagery, either visual, auditory, tactile or of any other kind.' (Rivers 1920, p. 11). His familiarity with imagery depends upon his dreams and on experiences in the half waking (hypnagogic) state. Elsewhere he reports: 'In my dreams I am a visualizer; I also often have perfectly definite auditory imagery.' Of his waking imagery Rivers declares that it is of 'so fugitive and vague a form that if my attention had not been attracted to the subject through my scientific interests, I should doubtless never have noticed such capacity for imagery as I possess' (1923, pp. 94-5). He adds that his waking imagery was more definite in his youth, though now it is so faint and fragmentary 'that the closest scrutiny is required for its detection'. At the opposite end of the scale of human imagery stands the

¹Quoted Pear 1935.

²Pear 1925.

³Ibid.

pioneer experimental psychologist Titchener, who will be discussed below under 'eidetic imagery' (see pp. 26-7).

It was the early investigations of Galton (1904) that first drew attention to these interesting variations of image life. Galton found that some people could visually image with a clarity, vividness and completeness that was comparable to the original percept.¹ Yet others had no more notion of what visual images are like than a blind man has of the nature of colour. The importance of Galton's findings can hardly be over-emphasized, and Galton himself stressed the ways in which unacknowledged differences of imagery readily lead to intolerant incredulity. For example, those who lacked visual imagery 'naturally enough supposed that those who affirmed it were romancing'. Today, surprise or perhaps polite amusement is aroused by those whose imagery differs markedly from that of their fellows. It is sobering to envisage the effects of such differences on human thought and action in earlier ages, for instance, in periods of religious intolerance and subtle theological argument. Recent researches such as those of Gordon (1949, 1950) have suggested that there is a relation between rigidity of image life and the stereotypes which accompany racial and other forms of human prejudice. There is little doubt that people have suffered persecution over issues which a competent modern logician would assess as meaningless and deriving merely from a confused use of words. We may also note the part that imagery can play in determining the choice of words and the subtleties of meaning given to them. It is not unlikely that among those called 'heretics' by the intolerant have been some who were persecuted simply because their imagery differed from that prevalent in the currently dominant political or religious in-group.

Even today individual differences in imagery have important implications. As an example we may note that it is not always

¹For the sake of brevity we shall speak of images as 'occurring'. Strictly speaking, of course, our data are the verbal reports of such imagery which individuals provide. Some of the earlier psychologists disliked investigations of 'subjective' phenomena such as imagery; this attitude is both scientifically unrealistic and out-of-date. As Galton wrote: 'I do not see why the report of a person on his own mind should not be as intelligible and trustworthy as that of a traveller upon a new country, whose landscapes and inhabitants are of a different type to any which we ourselves have seen.' (Pearson 1924, p. 243.)

easy for a person to communicate information about his own imagery to another person whose imagery differs greatly. Much sterile dispute would certainly have been avoided if thinkers had possessed more insight into such imagery differences and greater tolerance of individual variations. Among men of action Napoleon was one who appeared to view visual imagers with suspicion, for he regarded them as 'unfit to command' (Galton 1904).

IMAGERY AND IMAGINATION

The word 'imagination' on the title-page of this book, which is concerned with certain aspects of the psychology of thinking, implies that our examination will not be confined to such kinds of thinking as reasoning, logical argument and problem-solving. But before considering 'imagination' as distinct from these R-thinking processes, we must first clarify the relation between 'imagination' and 'imaging'. Unfortunately some psychologists of an earlier period used the word 'imagination' to denote merely the experience of visual, auditory and other images. This is perhaps one reason why scientific study of many of the problems that the word suggests to the layman has been somewhat neglected. The relation of imagery to 'imagination', like that of imagery to 'thinking', is certainly not a simple one. Moreover, such relations appear to vary so considerably between one individual and another as to suggest that generalizations are more likely to prove misleading than illuminating. If we were required to identify 'imagination' with any one kind of thinking rather than with another, our choice would certainly not be with imaging, but, rather, with fantasy: with the kinds of psychological processes for which the terms 'autism' and 'A-thinking' have been employed. The word 'imagination' itself is a layman's and not a technical term, and thus has other meanings, and may, for example, denote thought that is original and unproductive. We shall be more fully concerned later with the problems raised by the use of the word in this second sense.

A distinction is frequently made between *memory images* and *imagination images*. The (visual) image of Tower Bridge spanning the Thames and the (gustatory) image of the taste of the coffee I had for supper, both of which I have just called to mind, are

examples of memory images. If I imagine what the palace of Kubla Khan or the Tower of Babel looked like, I experience an imagination image. The distinction, although useful, is not an absolute one for two main reasons. First, no memory image is a complete and accurate reproduction of a perceptual experience. The word 'image' is itself a little misleading in this respect, since visual images tend to be creative rather than accurate in any photographic sense, and the same applies to images of the other sense modes. Secondly, no imagination image can occur that is not composed of elements derived from actual perceptual experiences; thus the difference between these and memory images is one of degree and not absolute. To understand imaginative thought it is necessary also to take account of the fact that we can have memory images of the products of other people's imaginings. We can learn about non-existent things by reading or by seeing pictures of them. Thus, to return to our earlier example, I can in fact form a visual memory image of the Tower of Babel from a painting I once saw of it. Imagination imaging, because of such modes of recording the imaginings of others, can thus be a highly cumulative process. (See Chapter V.)

In his *Dictionary of Psychology* Warren defines a mental image as 'an experience which reproduces or copies in part, and with some degree of sensory realism, a previous perceptual experience in the absence of the original sensory stimulation'. Images can be classified in numerous different ways. One way (as we have seen) is in terms of sense mode, as auditory, visual, gustatory, tactile, etc. They will be considered here rather in terms of the general conditions of their occurrence.

(1) *Ordinary waking images.* For most people imagery seems to play a part in everyday thinking and waking fantasy. Images apparently constitute interesting overtones in our reactions to those aspects of 'the not here and the not now' about which we think. In view of the wide individual differences noted, it is unsafe to generalize about the function that images perform in human thinking. Some people appear to think from image to image; others, largely without images. To others again the relation of their images to their thoughts somewhat resembles that of the illustrations of a book to its text; the images are, as it were, an unessential accompaniment, a luxury in whose absence thinking could occur equally well. Again, the nature of the thinking of two

individuals, each of whom says he makes use of 'verbal images', may be very different; one may hear the words, while the other visually images them in written form.

There are numerous ways in which ordinary images vary: in vividness, completeness and duration; in such qualities as colour (in the case of visual images); and in the extent to which they are under voluntary control. It may help our discussion to make a basic distinction in terms of this latter quality: to distinguish between *autonomous* images whose occurrence and content are independent of the subject's conscious intentions, and *controlled* images which depend upon voluntary control. The interesting studies of imagery in relation to prejudice conducted by Gordon (1949, 1950) suggest an association between the tendency to form stereotypes and a predominance of autonomous rather than controlled imagery.

(2) *Dream images*. The images of dreams tend to be visual and strongly autonomous in character. This predominance of visual imagery in dreams is probably one reason why they are so readily forgotten. It is easier to remember what has been verbalized, and many dreams appear to pass from conscious awareness before any kind of sub-vocal verbalization has taken place. Some readers will have experienced the 'loss' of a dream at the moment of waking or shortly after it, and may have attempted on occasion to retain the memory of dreams by verbalizing them. The communication of dreams, because they are ordinarily visual and not verbal things, is in itself an inaccurate process. Its difficulty and inaccuracy may be likened to that encountered in attempting to communicate accurately by words the characteristics of a picture or a series of pictures.¹ Dream images are highly autonomous and are typically reported as more vivid than ordinary waking images. Havelock Ellis (1911) regards the magic lantern rather than the cinematograph as the best analogue of dream imagery: 'Dreams are like dissolving views in which the dissolving process is carried on swiftly or slowly, but always uninterruptedly.' As Havelock Ellis suggests, the typical dream tends to resemble a play broken up into a series of scenes rather than a continuous chain of events.

¹The inaccuracy of this form of communication of visual subject matter has frequently been demonstrated in traditional experiments in the psychological laboratory. (McKellar 1952, pp. 186 f.)

The visual imagery of dreams may be accompanied or replaced by imagery of non-visual sense modes. We might instance the kinaesthetic imagery of flying dreams, as well as the auditory imagery of speech and other sounds. Sometimes a poor visual imager declares that he is able to understand what other people mean by 'visual imagery' from his own imagery in his dreams. Others deny that *their* dreams are composed of the visual imagery which we ordinarily associate with dreams. These dreams appear to be of a verbal, not a visual, kind, something like the process of 'thinking in one's sleep' that more typical dreamers may also sometimes experience. We cannot, therefore, safely assume that everyone has necessarily had personal experience of visual imagery, even from his dreams. Although this is probably rare, both the sleeping and the waking life of some people seem to be bereft of visual imagery.

Another a-typical phenomenon of dreams is imagery of a controlled rather than the more usual autonomous kind. Experiments have shown that a measure of voluntary control over dreams and their imagery can be achieved. Thus Arnold-Forster (1921) was able experimentally to increase the number of her flying dreams by observing and thinking about the flight of birds and aeroplanes before she slept; she thus provided herself with ways of escaping in her dreams from nightmare situations.

(3) *Eidetic imagery*. Some of the images reported by Galton's subjects were quite obviously of the eidetic kind. Galton (1880) found that eighteen of his group of 172 schoolboys—that is over ten per cent.—manifested ability to project their images. One reported: 'Holding a blank piece of paper in my hand I can imagine on it a photograph or any object that it will hold.' Another declared: 'I can project an image on to anything, but the longer I keep it the fainter it gets, and I don't think I could keep it long enough to trace it.'¹ Eidetic imagery was first noted by Urbantschitsch in 1907; the phenomena are, however, more closely associated with the later intensive investigations of the Jaensch brothers at Marberg. (Jaensch 1930.) Such images are of an unusually stable and persistent kind and have a quasi-perceptual character. The term 'eidetic' is from the Greek *εἶδος*, noun of the verb 'to see'. Jaensch presents evidence that eidetic images are 'seen', in the fact that they

¹Peck and Hodges (1937) report the case of a six-year-old child who maintained one visual eidetic image for as long as 1,104 seconds.

are obedient to certain of the laws which govern visual perception: 'they are always *seen* in the literal sense' (*ibid.*, p. 1). They have the same kind of 'out-thereness' quality as percepts, and in this respect closely resemble after sensations. An eidetic imager is typically able to 'read' from the imaged page of a book, or may, as in the famous instance observed by Galton, be able to perform calculations from an imaged slide-rule. (See p. 58.) A typical example reported by Allport (1924) from his experiments was of the ability to give the correct number of buttons on the coat of a subsidiary figure in a picture that had previously been shown.

Eidetic images are reported by Jaensch as often three-dimensional in character, and their colour may be brighter and 'more glowing' than an ordinary percept. A former colleague, a pathologist, has eidetic imagery which he finds invaluable to his professional work. After going home at night he is able to work over his patients, operations and postmortems in the fullest detail by subsequent eidetic imaging. His lecturing work is made easier also, and, as he declared of himself, 'one picture (eidetic image) is worth a thousand words.'¹ Jaensch established the incidence of eidetic imagery as occurring in approximately sixty per cent of children but only about seven per cent of adults.

Among the most interesting descriptive passages in the history of psychology are the introspections of Titchener—one of the most fluent and impressive lecturers Cornell University has ever had—concerning his own eidetic imagery. As a lecturer, Titchener must have derived considerable and unusual advantages from the eidetic quality of his image life. He had no less than three alternative sets of cues from which he could speak: 'I can read off what I have written from a memory manuscript; or I can follow the lead of my voice; or I can trust to the guidance of kinaesthesia, the anticipatory feel of the movements of articulation.' (Titchener 1909, p. 8.) If Titchener's mental life was colourful while he lectured, it appears to have been by no means unimpressive on less formal occasions. He wrote: 'I should say that I never sit down to read a book, or to write a paragraph, or to think out a problem, without a musical

¹One wonders whether poor visual imagers are likely to succeed in certain branches of medical science, for example, anatomy and pathology. Discussion with members of the Anatomy Department at Sheffield University suggests that in this group of anatomists at least the incidence of poor visual imagery is low.

accompaniment. Usually the accompaniment is orchestral, with a predominance of wood wind.' Little investigation has been carried out on non-visual eidetic imagery, though Titchener seems to have been an authentic case of auditory along with visual eidetic imagery. An instance of what might be called olfactory eidetic imagery will be discussed below under 'hallucination'. Visual eidetic images and hallucinations appear to shade into one another; once we depart from the visual and auditory sense modes, distinctions between vivid eidetic-like images and 'hallucinations' become somewhat artificial and difficult to maintain in any rigid form.

One of the commoner kinds of eidetic image is an imagery replica of sense data which has been fixated for a long period of time. For example, a person who has worked for some hours at a microscope sometimes has afterwards an eidetic-like image of the microscopic field. After a long period of weeding in the garden a person may experience, at least with closed eyes, perseverative eidetic images of the shapes of the weeds for which he has been looking. Perseverative experiences of a seemingly related kind occur in other senses—kinaesthesia, for example. Thus one may subsequently have vivid imagery of the movement of a ship in which one has been travelling, or of some activity like skating, playing tennis or dancing. Visual or other images of these kinds may occur just before sleep, and shade off into the imagery of the hypnagogic state.

(4) *Waking-sleeping imagery.* The images some people experience in the 'twilight' states which intervene between wakefulness and sleep will be discussed more fully in the next chapter. It is usual to distinguish the *hypnagogic* state that precedes sleep from the *hypnopompic* state that accompanies the process of waking up. Both types of imagery seem to occur in a variety of sense modes, though the visual and auditory kinds are much the commonest. The imagery has distinctive features, and in its qualities of vividness and autonomy may closely resemble hallucination. To illustrate these images we may quote the report of a student subject: 'When I'm very tired I see, involuntarily, distorted images of dwarfs and giants, and exaggerated and diminished images of objects which I know familiarly.' Such visual hypnagogic images are usually, though not invariably, experienced with closed eyes. Open-eyed visual images, and those auditory hypnagogic images that are mistaken for real sounds, shade off

into what might well be called 'hallucination'. Not the least interesting thing about hypnagogic and hypnopompic images is the fact that the phenomena have three frontiers: with dreams, with eidetic images, and with hallucinations. In marginal cases the most appropriate name is difficult to choose, though *typical* instances are fairly readily distinguishable from one another.

(5) *Crystal images.* Some people when they gaze into a crystal sphere or other polished homogeneous surface experience visualizations which have traditionally been given supernatural interpretation. There seems to be little reason why crystal images or visions should be regarded as anything but a specific kind of eidetic image, or experimentally induced quasi-hallucination. There is, of course, no reason to assume that every fortune-teller who gazes into a crystal and claims to have visions of the future actually 'experiences' eidetic imagery. On the other hand, though research has been neglected, there is sufficient evidence to establish the authenticity of the phenomenon. Crystal imagery has been elicited by the writer and his research colleagues under three different sets of conditions: (a) spontaneously in a suitably-chosen subject; (b) under the influence of verbal suggestion in an otherwise non-visualizing subject; (c) in subjects under the influence of substances which are used experimentally to induce hallucination, namely mescaline and *d*-lysergic acid. (See Chapters VI and VII.)

The following description was obtained from a spontaneous crystal-gazing subject who is also incidentally a vivid and regular hypnagogic imager. She herself accepts both types of imagery as purely natural occurrences and rejects supernatural interpretations. The sound recordings of part of one period of crystal gazing may be quoted: 'It looks like a large face. . . . Oh, it's horrible! It's like a large turnip. The eyes are a purple colour. The mouth turns down like a great fat sausage—horrible-looking face—fading away now. It's like an eye . . . a gold coloured side to it. It's faded too. There's a book. It looks as though it's lying on a bookshelf—a black book with gold lettering on it. It seems to be drifting upwards.' She also said that the images appeared 'to come out of a pin point of light, and sort of grow, magnify and become clearer'. Afterwards the image seemed to 'drift away like smoke in the air'.

Another subject, given the verbal suggestion that she would experience crystal imagery, hallucinated a medieval fortress, the New York skyline, and the menacing shape of a King-Kong-like

figure, casting its shadow over the buildings. Crystal images appear somewhat to resemble visual hypnagogic images, but were reported as having a more markedly three-dimensional quality. In the cases studied they had the same 'out-thereness' characteristics as eidetic images, and seemed to be 'contained' within the crystal. These qualities were emphasized by another subject, experiencing crystal imagery after taking lysergic acid, who remarked of the imagery: 'I could quite easily step back and it would still be there.' They were autonomous and vivid, being likened by yet another subject to the appearance produced by looking through the crystal at a photograph placed against the other side of the sphere. The images tended to be coloured.

Among pioneer scientific investigations of crystal imagery were those conducted by Morton Prince (1922), who was able to induce in one subject simultaneous crystal images and automatic writing. Detailed examination of the parallel records revealed a similarity of content in both. There remains considerable scope for scientific investigation of the interesting frontier between imagery and hallucination represented by these crystal experiences.

(6) *Hallucinations*. The artificiality of any rigid distinction between 'imagery' and 'hallucination' has been suggested in the previous pages. Some hypnagogic, hypnopompic, eidetic and crystal-gazing experiences might well be classified as hallucinations rather than as images. (Freud, for instance, uses the term 'hypnagogic hallucination' instead of 'hypnagogic image'.) It seems better to follow Galton's suggestion and to think of these various experiences as forming a continuum rather than a series of rigid categories. On such a continuum we might place waking and dream images; imagery of the twilight waking-sleeping states; eidetic images; quasi-hallucinatory experiences, particularly those experienced under conditions of low illumination; and, finally, gross hallucination.

Auditory rather than visual hallucinations characterize the group of psychoses categorized as 'schizophrenia'. Visual hallucinations, on the other hand, are characteristic of *delirium tremens*. It has been observed that inflammation of the optic nerve may produce 'luminous phantasms' (Müller 1848), and that a delirious patient will sometimes experience 'dream-like hypnagogic hallucination when he shuts his eyes' before open-eyed visual hallucination begins to occur (Cameron 1947). To illustrate

auditory psychotic hallucination we may instance the account given in interview by one schizophrenic patient. He declared that these 'voices' were more likely to be heard when he was alone than when in the company of other people; they tended to repeat his own thoughts, but were quite distinguishable from his own voice; he did not experience hallucinatory sounds other than voices, and had never experienced visual hallucination. Visual psychotic hallucination is illustrated by another schizophrenic patient who reported three snakes which appeared at the end of his bed; they had black mouths and speckled skin, and seemed very real. On one occasion this patient experienced hallucinatory movement of a picture on the front of a magazine.

When the dominant sense mode is other than visual or auditory, vividness of imagery may serve to blur any absolute distinction between image, percept and hallucination. Reference may again be made to Professor Drew, whose most vivid imagery is olfactory. He reports: 'I seem to have a fairly acute sense of smell but I have learned not to rely on the information it gives me, because I have so often been misled by mistaking imagery for percepts. This olfactory imagery is rather a nuisance, as I now distrust my olfactory experiences unless other people experience them at the same time.' Interesting confusions occur over the smell of perfume: 'If I am speaking to a man, I know it is an image, but if it is a woman I cannot tell whether she is wearing it or whether I am experiencing an image.' (Personal communication, 1954). Granted such vividness of imagery and accompanying sensory acuity, a sharp distinction between 'hallucination' and 'image' becomes difficult to maintain. It becomes largely a formal or verbal matter whether a given experience is to be described as the one rather than the other. Also of interest is the socially-sanctioned bias of man's vision-audition centred system of thought. Much that applies to perceptions of these two dominant senses and their corresponding imagery merits caution when applied to the 'lower' senses such as touch, temperature, taste and smell. We shall try from time to time to avoid the bias of the human vision-audition centred standpoint, especially in discussing the phenomenon of 'synaesthesia' in a later section. (Chapter IV.)

In this chapter an attempt has been made to outline some of the forms of imagery that human beings experience. Any such experiences available to a given individual may provide important

subject matter for his thought products and imaginings. Some but not others of these imagery phenomena may be familiar to the reader as part of his own mental life. We have noted the personal parochialism that a given man's imagery characteristics may introduce into his thought. First, there is the possibility that he will find it difficult to empathize with the thought processes of others whose mental imagery is markedly different from his own. Secondly, there is the possibility that he may, on the basis of his own introspections, attribute to others imagery characteristics of a kind which they do not possess. To minimize these two tendencies, we have tried to give some indication of the highly varied forms that man's image life may take.

CHAPTER III

BETWEEN WAKEFULNESS AND SLEEP

Hypnagogic Imagery: Imagery of any sense modality, frequently of almost hallucinatory character, which is experienced in the drowsy state preceding deep sleep.—H. C. WARREN, *Dictionary of Psychology*.

INTERESTING and little understood psychological states divide wakefulness and sleep. When falling asleep, for instance, some people experience vivid visual or other images of a quasi-hallucinatory kind. The visual form was well described by one of our subjects as being 'like a succession of lantern slides, appearing without voluntary control, and containing detailed material which I didn't know I knew'. Investigation suggests that hypnagogic imagery is more common than is usually realized; a few people have the experience regularly, others have it occasionally, while to others again the imagery seems to be wholly unknown.

From the process of falling asleep and the accompanying imagery that sometimes occurs may be distinguished the waking-up, or *hypnopompic*, state. In this, imagery of a characteristic kind also occurs and might be likened to dream activity that lingers during the return to wakefulness. Resemblances hold between such hypnopompic images and those of the hypnagogic kind, although in the investigations to be discussed the two types have been treated as distinct. We shall deal principally with hypnagogic images, with which our researches have been mainly concerned; but first we shall consider briefly the imagery of the waking-up process.

Hypnopompic images occur, then, in the drowsy state before full wakefulness and are a perseveration of dream imagery into the waking-up process. As one of our subjects reported of herself, 'dream atmosphere and figures continue for a few moments after I wake, so that I am surprised by my surroundings'. Hypnopompic experiences were usually reported as occurring when the eyes are closed though, as in the following case, they are sometimes experienced open-eyed: 'When waking up in the night and opening my eyes, I have seen images which usually take the form of faces.

Upon closing the eyes they disappear. Once the image took the form of several calves all advancing towards my bed.' This subject frequently had such imagery, which was invariably coloured. Hypnopompic experiences are not always visions; equally impressive images occur to some people when the non-visual senses are involved. Havelock Ellis (1911) reports the case of a young girl who experienced a rather alarming tactile hypnopompic image on which, incidentally, she placed a supernatural interpretation; she awoke from a dream and 'felt a hand grip her shoulder three times in succession'.

Certain of these images have a strongly anticipatory character, well summarized by one subject who describes his as 'usually connected with what I'm going to do that day'. Several subjects had anticipatory hypnopompic images of the sound of their alarm clock or some other waking-up signal. One reported both auditory and tactile imagery 'of a bell going off, generally, or of a hand shaking me. These seem to occur most often when I particularly want to get up early'.¹ The fact may be stressed that these images represented the waking signals, and were not provoked by them, as is again evident in the following example: 'I have had auditory images when waking up, e.g. the sound of my mother's voice telling me to wake up, etc., and then a few minutes later she will come up and wake me.'

Occasionally these anticipatory hypnopompic images display losses of insight such as can occur during brief periods of loss of consciousness accompanied by vivid imagery. In such instances normal sleep and normal waking up may reproduce happenings resembling certain phenomena of psychosis discussed in Chapter VII. Thus one subject said: 'Often when I am waking up I imagine I am really up and am going about the morning's work: washing, shaving, etc.' Also rather striking is another's report: 'After I have been wakened and am falling asleep again, I have imagined myself dressed and downstairs, though actually I discover I am still in bed.' Hypnopompic images of this anticipatory type, together with those of the wish-fulfilment kind, would readily lend themselves to interpretation as visions of the future, omens or 'second sight' experiences.

¹Such a hypnopompic image as this might well be considered in relation to the process of concretization of thought, occurring in sleep and its surrounding states, and in psychosis. See Chapters VII and XII.

Hypnopompic imagery was found to occur in thirty-nine of the group of 182 student subjects investigated (21.42 per cent.). Our findings suggest that it is considerably less common than the imagery or quasi-hallucinations of the hypnagogic state, about which more detailed information is available. We shall first discuss its incidence.

HYPNAGOGIC IMAGERY

In 1925 Leaning drew attention to the neglect of the subject of hypnagogic imagery by scientific investigators.¹ The comprehensive survey she conducted of this field suggests that about a third of normal adults experience *visual* hypnagogic images. Investigations conducted at Aberdeen University (McKellar and Simpson 1954) accord with Leaning's findings rather than with the incidence reported by Müller (1848), who found the imagery in only one to two per cent of a student group. A further study with a larger group of 182 Aberdeen students has been conducted, and sixty-four of these reported having experienced at least one visual hypnagogic image. A finding of some interest was, that comparable auditory imagery was more frequent still for the group investigated, being reported by seventy-eight students. Imagery of the other sense modes also appeared to occur, though more rarely. When vision, audition, and these other modes were gathered together the incidence rose to 115 of our group of 182 subjects, that is, to 63.18 per cent. The commonest form that hypnagogic imaging assumed was auditory imagery alone, the next commonest form being auditory and visual, the third commonest visual alone.

TABLE I

KINDS OF HYPNAGOGIC IMAGERY

<i>Hypnagogic Imagery</i>	<i>Number of reports</i>
Auditory	78
Visual	64
Kinaesthetic	13
Thermal	2
Tactile	1
Olfactory	1

¹The first systematic investigations of hypnagogic imagery were begun by J. Baillarger in 1853. The phenomena have been known from early times, though the term 'hypnagogic' was first introduced by Maury, one of the pioneer scientific investigators.

The overall figure of sixty-three per cent. does not include hypnopompic images and also excludes the very common and perhaps related experience of 'falling' which some people have when dropping off to sleep. There was no statistically significant difference between the men and women students in incidence of hypnagogic imagery. Frequency of occurrence was investigated separately for visual and auditory imagery, subjects being asked to indicate whether it occurred 'regularly', 'often', 'occasionally', or 'never'.

TABLE II
FREQUENCY OF IMAGERY

	<i>Visual</i> <i>Hypnagogic</i>	<i>Auditory</i> <i>Hypnagogic</i>
Regularly	4	4
Often	8	18
Occasionally	52	56
Never	118	104
<hr/> Totals	<hr/> 182	<hr/> 182

Accurate figures are obviously difficult to obtain in a field such as this, but our figures may indicate approximately how many individuals have the experience, and how often. They suggest that hypnagogic imaging is, like dreaming, a 'normal' rather than 'abnormal' psychological occurrence; and in addition to its statistical normality it seems perfectly compatible with mental health. The phenomena are of interest precisely because they can mean very different things to different people. To a psychologist or psychiatrist they may be simply an interesting topic for study; to a writer or painter they may be valuable subject matter; to a superstitious person they may be 'omens' or instances of 'second sight'; to a normal adolescent or to some one who fears 'insanity' they may be a source of worry, even terror.¹ Much light has been thrown on the understanding of normal personality by studies of the abnormal; hypnagogic experiences may illustrate the opposite process, namely a normal phenomenon illuminating the study of the abnormal.

¹We have several instances of people who have sought medical help simply because they thought their hypnagogic images were a sign of psychiatric abnormality.

Visual hypnagogic images. A marked characteristic of the hypnagogic images we have studied has been their autonomy. Subjects frequently stressed their inability to control either their occurrence or their content. This quality was noted by Henslow, one of Galton's subjects who made a detailed study of his own visual hypnagogic images and reported: 'When the process is in full activity I feel as if I were a mere spectator at a diorama of a very eccentric kind, and in no way concerned with the getting up of the performance.' (Galton 1885, p. 117.) Related to this autonomy and lack of control by their author, is the weird sequence of images that frequently occurs. Thus Freeman (1950) reports successive visual hypnagogic images that comprised a camel standing on a hilltop, fountain pens being filled, a screen composed of turkey feathers, a rowing eight on the river, an ice cream cornet, and so on. These almost alarmingly improbable sequences are very typical of the imagery and are sometimes a little reminiscent of a surrealist painting.

Subjects quite frequently likened the images to lantern slides, and the analogy is helpful in elucidating an apparent difference in mode of succession between hypnagogic and dream images. A dream might be likened to a succession of lantern slides presented in arranged order and used to illustrate a lecture to which they are relevant. The order of succession may not be predictable, but each succeeding dream image tends to have a measure of connection with what has gone before and with some underlying theme. Hypnagogic visions are different. They might better be described as resembling lantern slides which have been mixed up and shown in random order. Yet the confusion is greater even than this. A dream has a certain unity—the lecturer's theme and his slides all belong together; the dreamer does not have extraneous thoughts except in rather a-typical dreams. Not infrequently, and perhaps typically, visual hypnagogic images seem curiously irrelevant to any thoughts going on at the time. When asked to distinguish the images from dreams, many of our own subjects mentioned their ability to have other thoughts and unrelated perceptual experiences while the imagery was going on. Hence the images might well be likened to slides which have not only been mixed up but were really intended for some other lecture. This awareness both of discontinuity of succession and irrelevance to one's other thoughts and percepts at the time may on occasion impress the subject very deeply.

A further feature of visual hypnagogic images is the fact that they may surprise their authors by their highly creative and un-reproductive character. The following instance, reported by a vivid hypnagogic imager, gives some hint of the rich source material for imaginative activity provided by such images. 'I was seeing green cockatoos swaying on soft bamboo or creeper. I was dozing off and I distinctly saw, and heard a jungle sort of noise—bright sunlight and those birds waving up and down: green and brown and vivid, vivid yellow. The brown was a light brown—bamboo, trees and undergrowth.'

Although the visual hypnagogic images may be monochromatic, they are frequently reported as coloured in unnaturally vivid hues. Some of our subjects likened these hues to those of 'technicolor' rather than of nature. Lady Berkeley, who attempted with considerable success to paint a series of her own hypnagogic images and was therefore specially concerned with accurate observation of their colour, uses terms like 'liquid fire' and 'strange luminosity'.¹ (Leaning 1925.) Changes of size and distortions of shape of the imaged objects occur in some of the visual experiences, and may contribute to their effect of 'originality'. An instance of this has been considered above (p. 27). Another of our subjects reported images of people known to her which 'always grow bigger and bigger until I cannot picture them, or fade away to a single point'. Hypnagogic experiences involving an impression of size change or shape distortion of the imager's own body—body schema experiences—are discussed below. Of related interest are the hypnagogic images of *faces* which sometimes occur, and which may exhibit size or shape disturbances.

Visual hypnagogic imaging has been called 'the faces in the dark phenomenon', although this is only one form that the imagery assumes. One of our subjects saw 'a large bloated yellow head, pouting red lips, wild blue eyes rolling, hair dishevelled. . . . The mouth was moving but there was no sound.' The relevance of the 'faces in the dark' imagery, not only as source material for superstitious belief but also to the night terrors of children, might

¹Several of our subjects reported their wish that they had talent enough to be able to paint their images. Lady Berkeley's paintings which are, to the writer's knowledge, the most successful attempt at direct reproduction of hypnagogic imagery, are in the possession of the Society for Psychical Research, London.

be suggested. Some subjects reported instances of rather frightening imagery occurring with open eyes, and the effect of the following at the time of its occurrence is not difficult to estimate: 'Terrifying faces, one replacing the other. This happened quite often when I was younger. . . . They seemed too vivid and too extraordinarily evil not to belong to something real, somewhere'.

In discussing hallucinations we made a distinction between those resembling the nightmare and anxiety type of dream on the one hand and those resembling the classical wish-fulfilment dream on the other. Hypnagogic images also seem to range between these two extremes. As an illustration of the frightening kind we have noted the 'faces in the dark' images, but other instances may be taken. One of our subjects said: 'I see skeleton figures, firstly very thin, and then very fat. They appear alternately. . . . I see this very often.' Some reported hypnagogic imagery of their childhood whose content appeared to provoke fear and terror. Witches figured prominently in several of these, as in the following case: 'Witches black and brown with hooked noses and bulging eyes floated through the air like cardboard effigies.' Such imagery, along with nightmares, is relevant (as we have seen) to malevolent demons and other frightening products of human imagination. Yet imaginative activity may be stimulated by certain images likely to evoke quite different emotions such as amusement, enjoyment and interest. One subject reported 'a dachshund dog dressed in a tartan coat and breeches with a puppy dressed the same. It was very amusing . . . they were dancing.' Suggestive of wish-fulfilment is the image of one subject who saw himself as 'an outstanding cricketer actually on the field hitting sixes and fours amidst great applause'. This image was experienced open-eyed some of the time.

In view of these variations of content it is not surprising that emotional reactions to the imagery also varied widely. The emotional tone of content and resulting attitude alike may derive from differences of personality involving tendencies to experience a predominance either of pleasant or unpleasant images. It is possible on the other hand, that in any given instance the emotional mood before settling down to sleep determines the emotional tone of the images. Rivers (1923) contends that this is also the case with dreams. Whatever the explanation, some subjects certainly enjoyed their hypnagogic images. One reported 'a succession of twenty or so

images', and added, 'it was wonderful'. Another described them as a 'background to sleep, almost in fact a lullaby'. The opposite extreme is illustrated by the woman who described her imagery as 'a terrible jungle through which I have to pass before sleep comes'.

We have seen that hypnagogic visions were frequently likened to lantern slides in their mode of presentation. One subject described hers as 'a series of images which pass across my field of vision from right to left as if projected from a magic lantern that is being rotated. I cannot hold them long and the pictures seem unrelated to each other.'¹ Hypnagogic visions sometimes seem strange, grotesque and foreign to the personality of the imager himself, who finds it difficult to accept them as a product of his own mental life. The apparent lack of connection between one image and the next which has been noted and which is mentioned by the last subject, probably contributes to this sense of strangeness. This impression may be enhanced by the unusual angles that many of the images exhibit. One of our subjects commented on this: 'You get the most peculiar view of things. . . . Humpty Dumpty from the back, or the back of a peacock, or a windmill from below looking up, or viewed from a helicopter.' Some of the images appear to last only momentarily, others a few seconds, and others for a period of minutes. Freeman (1950) reported that in his own case the images came at the rate of about six a minute. We have been able on more than one occasion to make sound recordings of subjects' commentaries on their hypnagogic images *at the time of their occurrence*, and the duration of some of the images was timed. One subject had a hypnagogic vision of an alligator that lasted two and a half minutes, of a field of wheat that lasted fifty seconds, and of a pencil shape that persisted eighteen seconds. Others were so brief as to defy timing. Although these figures are, of course, merely approximate, particularly since the subject often saw 'something' before being able to give it a name, they indicate some varying periods of duration.

¹This experienced right-to-left movement presents no great mystery. It was first observed by Delage that hypnagogic images follow eye movements (Ellis 1911). The writer, who occasionally experiences visual hypnagogic images, has confirmed this observation in his own case.

OTHER SENSE MODES

Hypnagogic images are not invariably visual. We have seen, in fact, that with the student group investigated they proved to be more commonly auditory. In considering these other sense modes we shall draw for illustrations on the 182 cases of the main investigation and from instances collected in a previous pilot enquiry. (McKellar 1953.)

The content of the visions is difficult to classify because of their almost infinite variety. In the case of *auditory hypnagogic imagery*, classification is much easier since the commonest auditory images were either voices or music. One subject reported hearing the voice of her mother: 'I started up thinking she had called out to me.' Another said she heard her name called 'in a sharp frightened voice'. She added that the image 'was so vivid at times that I confused it with actual hearing and wanted to know who the person was'. These confusions with real sounds occurred in a number of other cases, particularly when the imagery was of voices. Confusion of hypnagogically imaged music with the noises of reality also occurred, and more than one of our subjects descended the stairs believing that the wireless had been left on. On occasion these auditory images of music were quite specific, as is illustrated by a subject who recurrently imaged the last movement of Rachmaninov's Second Piano Concerto. This subject added: 'Occasionally I hear the first movement of his Third Concerto, which I do not know well enough to construct in my mind when I am fully conscious.' (McKellar and Simpson 1954.) Sometimes, as in the case of the visual hypnagogic imagery, the content of these auditory images appeared to be original rather than reproductive. We have, in our own series, no instances of musical composition under hypnagogic conditions; but it will be seen later that Wagner said he had constructed a now famous piece of music from auditory hypnagogic imagery. (See p. 72.)

It will be noted that in our main investigation *kinaesthetic hypnagogic images* occurred in thirteen instances of our sample of 182 students. This places kinaesthetic imagery third in order of frequency. To illustrate: 'I often imagine myself out hunting on horseback and can feel myself bracing to take jumps, check my horse, urge him on, etc.' Another subject reported the following kinaesthetic image: 'I seemed to have acquired a large, powerful

motor-cycle, and I can distinctly recall going through the motions of starting it and moving off.'

Olfactory hypnagogic imagery was described by Leaning as very uncommon and she found only two such instances in the literature. One of our subjects experienced such an image, in this case an olfactory image of 'the smell of cigars'. More common are images of the *tactile* kind; another of our subjects reported the hypnagogic experience of a 'feeling of touching something, e.g. holding someone's hand'. Another reported: 'Just as I am falling asleep I may kick a stone in bare feet, trip, or walk into something.'

From hypnagogic images confined to a single sense mode may be distinguished *composite* images involving two or more such modes. Thus one of our subjects described having conducted an orchestral performance in a hypnagogic image, and added: 'I heard the music; I saw the choir and orchestra (and audience); I felt the movements of my arms.' Another of these composite images is of interest because it involves *temperature*. The subject hypnagogically visualized a scene with mist over the sea 'with sun glinting on the water and heather on the hills, and a sensation of warmth'. A detailed account of one of these composite images was provided by one of our subjects, whose description merits quotation in full:

I have very frequently had an image of this hypnagogic kind when falling asleep. Recently I imagined myself on the tube in London. I came off at a certain station and for some reason tried to cross the line. I stepped on the electrified line and received a shock. I screamed, and several hands reached down to pull me up. Just then another train came rushing into the station and just as it was on the point of touching me I shook myself and realized I was not asleep but only imagining the situation. The image was much more vivid than an ordinary dream.

This image differs markedly from the disconnected sequences of seemingly unrelated pictures which comprise some of the other forms of hypnagogic imaging. It resembles a dream not only in its duration but also in the participation of the subject herself in the experience. Of interest too is the electric shock, which is possibly classifiable as a case of hypnagogically experienced *pain imagery* such as (like other types of pain imagery) is certainly rare. The experience is also interesting because it might readily have

been interpreted in a precognitive or otherwise superstitious way had the imager's beliefs disposed her to this type of interpretation.

A special category of hypnagogic experiences comprises those involving the impression of changes occurring in the subject's own body. *Hypnagogic body schema experiences* occurred in twelve of the group of seventy-two student subjects who were investigated from this standpoint. Thus one student reported: 'When I was quite young I often had the experience when falling asleep of my body seeming to swell, and it seemed as if someone was sticking pins into me. At the same time the walls of the room seemed to close in on me (my eyes were closed at the time).' Such bodyschema experiences occur under a number of other conditions including the experimentally-induced psychotic-like states which follow administration of mescaline and lysergic acid. The body schema change and accompanying closing in of the walls of the room reported by the subject quoted are remarkably reminiscent of rather common mescaline-induced phenomena. (See Chapters VII and VIII.)

HYPNAGOGIC IMAGERY AND ORIGINALITY

The wide variety of our subjects' visual hypnagogic images made their classification in terms of content impossible. On the other hand they fell readily into a classification, based on their qualities of originality or otherwise, into two categories which we have tentatively called 'perseverative' and 'impersonal' (McKellar and Simpson 1954). The *perseverative images* are those whose content can readily be explained in terms of past experiences, particularly those of the day before. Thus one subject said: 'I get visual images of people I had met during the day, or if something interesting had happened that day I see it again in my mind.' Another reported: 'All those that I can remember are connected with gardening activities of the previous day.'

Some readers may have had hypnagogic experiences of this perseverative kind, which often seem to follow visual fatigue or some task involving close visual attention. For example, some people may experience visual hypnagogic images after a period of weeding in the garden, when the shapes of the weeds appear hypnagogically. One psychologist, Miss Margaret Sutherland of Belfast, reports having had experiences of this kind on the evening

of a day of strawberry picking. Miss Sutherland writes of the imagery: 'It was extremely vivid, in glowing colours (red and green of course); a formal pattern of strawberry and leaf alternating. I was surprised at the time to find that I could visualize the characteristic leaf pattern so accurately, being usually ignorant on such points.'¹ She adds: 'It appeared almost as soon as I closed my eyes; I know I was still awake because I commented on the image to other fruit pickers in the dormitory—some of them had had similar experiences.' At the time she was, she said, 'extremely tired' and 'ready to fall asleep at once'.

We have termed *impersonal* the other type of hypnagogic imagery, because the constituent percepts cannot easily be located in the imager's personal experience. Moreover the images, by virtue of their originality, often seem strange and foreign to the personality of their author. Thus the psychologist quoted above described such an image of 'a plain with various carved pillars' which struck her as 'utterly foreign—the sort of thing that might be described in the kind of travel book I don't read'. Many images of this kind, to which we may add the 'original' pieces of music heard, and imaged scenes so striking that their authors wished they had talent to paint them, have already been quoted. Granted appropriate beliefs, the quality of such imagery is of the sort to favour a variety of interpretations. They may be explained as coming from some 'inner' and archetypal source; as clairvoyant views of some 'other' world, or visions of future events; or as products of the 'astral' plane. According to our contention as to the sensory origins of human thought products, we should reject these explanations, both the a-scientific and the quasi-scientific ones. We suggest that such images—however original and however seemingly unproductive of perceptual experience their content—can be dealt with by the same kind of free association techniques as are applicable to the analysis of dreams. It is contended that this will reveal, in the past perceptions of the imager, a sensory origin for each item of content.

Some of these impersonal images were examined through free association technique from this standpoint, our interest being both in the emotional preoccupations that the images represented and the reactivated selection of past experiences through which this theme was expressed. One subject reported

¹Miss Sutherland reports: 'I can't visualise the leaf now.'

an image of 'a beautifully formed and perhaps varnished claw . . . vividly and accurately coloured . . . a cloud effect at the base of the picture like backs of sheep.' He was unable, by any simple introspection, to explain the image in terms of past experiences. A detailed description of the image was first obtained and then free associations were sought in relation to each item of content. The analysis, reported more fully elsewhere (McKellar and Simpson 1954, pp. 272-3) may be summarized in terms of its main finding.

The subject's associations indicated that the image symbolized or dramatized a problem which had recently been worrying him. Together with his wife and children he was staying with a relative who owned a much pampered dog. His children, in the course of conflicts with this animal, received scant sympathy from the relative—the owner of both house and dog—and even when the animal provoked them the relative unfairly 'sided with it' against them. Such a situation was a matter of some annoyance to the father, who imaged the threatening claw and what proved to be 'small objects' (the children) at the base of the picture. The image appeared to be a pictorial representation of this minor but recurrently aroused emotional preoccupation. Moreover, the association period provided detailed explanation of the content of the imagery which arose from a number of relatively recent perceptions: clouds seen from an aeroplane, the mounting of a stuffed animal's head and a surrealist picture, which together largely determined the overall composition of the image. Some success was achieved in attempts to analyse other impersonal images in this way; and the studies suggest that hypnagogic images may well provide a promising field of investigation as clues to the understanding of the individual personality and its emotional preoccupations.

Coleridge has made a distinction between imagination of the kind that involves 'joining together' and that which involves 'fusion' of the component elements. Many typical dreams and the 'impersonal' type of hypnagogic image illustrate such fusion in very clear-cut forms. In such cases it may be a task of considerable difficulty to separate the component elements and locate them in past experience. The process by which such fusion occurs and gives birth to 'original' thought products will be considered in various parts of this book. A hint of how it may operate in

hypnagogic imagery is provided by Galton (1882) in his discussion of visions.

Galton's analysis is in terms of his experiments in making composite photographs; that is, the simultaneous projection of pictures of two or more individuals on to the same area of a screen or photographic plate. When adjustments are made of the two projections 'eye to eye and mouth to mouth, and so superimposing them as exactly as the conditions allow, a new face will spring into existence'. This new production, Galton adds, will have 'a striking appearance of individuality, and will bear a family likeness to each of its constituents'. It is in terms of such a process that Galton would explain the creative or non-reproductive type of visionary experience. We have, he continued, considered the fusion of only *two* components. Granted a blending of many such components, 'the number of possible combinations would be practically endless, and each combination would give a new face. There would thus be no limit to the dies in the coinage of the brain.' The subsequent findings of Katz (e.g. Katz 1948) show that composites composed from different, randomly selected photographs tend to resemble each other, but that selections from different categories of photographs (e.g. from Swedish children as opposed to English children) tend to provide dissimilar composites. Galton's pioneer work is naturally less explicit on this point, but his conclusion that the photographs fuse to provide 'new' faces is confirmed by the later investigation. Granted suitable sampling, the range of originality thus resulting seems to be not greatly restricted, though it is perhaps more restricted than Galton initially believed. This analysis suggests an explanation of how, for example, the 'faces in the dark' may be unlike any individual face the subject has previously seen, and how scenes and patterns occurring hypnagogically may greatly impress the imager by their originality.

INVESTIGATION OF HYPNAGOGIC PHENOMENA

The very interesting intensive investigations made by Silberer of his own hypnagogic thinking will next be considered. Silberer first became concerned with the phenomena on an occasion described in his principal paper. He was lying on a couch in a relaxed state and forcing himself to think through a problem of

philosophy, namely a comparison of Kant's and Schopenhauer's respective theories about time. In his drowsiness he found himself unable to sustain the two sets of ideas side by side. He fixed Kant's theory firmly in his mind, turned to Schopenhauer's, and then sought to return to Kant's; this, however, 'was gone again, and beyond recovery'. The ensuing psychological events seem to be of the first importance for the understanding of hypnagogic imagery, and perhaps of other forms of A-thinking also. Silberer reports:

The futile effort to find the Kant record which was somehow misplaced in my mind suddenly represented itself to me—as I was lying there with my eyes closed, as in a dream—as a perceptual symbol: I am asking a morose secretary for some information: he is leaning over his desk and disregards me entirely: he straightens up for a moment to give me an unfriendly and rejecting look.¹

Of this pictorial representation of his problem in concretized form Silberer adds: 'The vividness of the unexpected phenomenon surprised, indeed almost frightened me. I was impressed by the appropriateness of the unconsciously selected symbol.'

This incident led Silberer to conduct a systematic investigation. His record comprises accounts of his thought on each occasion and of the ensuing imagery as he relaxed in the hypnagogic state. Thus he once lost the thread of his thinking and experienced a hypnagogic image of 'a piece of typesetting with the last few lines gone'. At another time he was acutely aware of the laryngitis from which he was suffering, of his temperature, and of his difficulties in swallowing saliva. The ensuing hypnagogic image was of 'a picture of a water bottle which I am supposed to swallow: after each swallow another one takes its place.'

Silberer interprets these phenomena, to which he gives the name 'autosymbolic', in terms of regression to the lower and more primitive mode of intellectual functioning characteristic of the hypnagogic state. This view is highly compatible with the theory later developed by Rivers (1923), who viewed dreaming as 'an expression of early modes of mental functioning which have been allowed to come into action owing to the removal of higher restraining influences derived from the experience of later life'. It also has resemblances to the interpretation which Jaensch (1930) placed upon eidetic imagery.

¹ Silberer 1909, p. 196.

Our own emphasis is upon the similarities which hold between dreaming, hypnagogic, eidetic and hallucinatory phenomena as instances of A-thinking. Processes of concretization of thought very similar to those reported hypnagogically by Silberer certainly occur in the natural psychoses and also in their experimentally produced analogues. While concretization as such is discussed later (Chapters VII and XII), it may be profitable here to record our confirmation of Silberer's experience of hypnagogic concretization in some of our own more intensive investigations of hypnagogic imagery. Some of these were so dramatic that one is glad to be able to support one's own evidence that they did in fact occur from Silberer's earlier and independent investigation.

An illustrative instance will be taken.¹ The subject was a young woman who is a regular and vivid visual hypnagogic imager. She was asked to relax on a couch one evening when she was very tired, and the experimenters were able to sound-record the ensuing hypnagogic imagery, which lasted for nearly an hour. Towards the end of the session the subject was asked to explain the meaning of the proverb 'Too many cooks spoil the broth'. In her drowsy state she was unable to do this, but reported an immediate image of 'little men in white overalls . . . there were two . . . two men'. The image suggests not merely an interesting concretization, of cooks in white overalls, but also a product of clang association, 'too many—two men'. These and other phenomena that occurred resemble those reported by Silberer. They suggest a weakening of R-thinking processes and an increasing dominance of simpler, more concrete A-thinking processes. Such regressions occur also in dreams, and Silberer himself stresses that 'functional symbolism' in dreams is no less worthy of study than the sort of symbolism emphasized by Freud.

Several other points emerging from these sound recordings of hypnagogic imagery are worthy of consideration. For instance, the subject just quoted observed that the imagery in her case covered a large area, only portions of which could be described while the field as a whole lasted. She said: 'I try to pick out the

¹We are indebted to Miss Sylvia Sutherland who acted as subject. At the time of this experiment we were unaware of Silberer's researches and are indebted to Mr. R. K. McKnight for drawing attention to Piaget's report of this work. The reader is advised, however, to consult Silberer's own report or Rapaport's translation.

clearest of a mass of things . . . as though you were trying to pick the main thing out of a picture.' At one time she was concentrating her attention on a fish in a glass case in 'the bottom right hand corner' of the field of vision. The experimenter asked if she could add an image of himself to the picture. She could do this, and the experimenter's figure was imaged with the fish and glass case 'roughly' at his feet. The subject emphasized, however, that this constructed image differed from the hypnagogic image; that it was not 'part' of the hypnagogic phenomenon. Nor did the images fuse, although both persisted for some time.

This case provides interesting evidence of the strongly autonomous nature of the images. It suggests the possibility not merely of having other *thoughts* during hypnagogic imagery, but even that ordinary *visual imagery* can co-exist along with hypnagogic visualizations. Another event which took place during the same experiment again indicated the difference between imagery of the ordinary type and that of the hypnagogic state. The hypnagogic image occurring at the time was of a waterfall. The subject, who—though a regular hypnagogic visualizer—is not given to auditory hypnagogic images, was asked if she could 'hear' as well as 'see' it. Her reply suggests the difference in quality between hypnagogic and ordinary images, for she said that she 'could *imagine* sound to go with it', but added that she could not '*hear* it'. These instances are quoted merely because they suggest lines of enquiry for those future investigations that are obviously overdue in this interesting and neglected field. The last instance quoted indicates the complexity of the phenomena. It shows the sterility of 'imagination' as an oversimplified concept, interpreted solely as the process of 'having imagery'.

Some investigators, such as Collard (1953), have doubted whether drowsiness and subsequent sleep are invariably needed for the occurrence of 'hypnagogic' imagery. Collard places emphasis on relaxation rather than on the hypnagogic state as a necessary determinant. Some of our own subjects reported imagery of this kind, for example: 'I can be in bed wide awake or even have them in the ordinary course of the day if alone.' From a strictly verbal point of view these deviant cases can hardly be called 'hypnagogic', though they often seem to resemble closely, in their quality and content, the imagery of the hypnagogic state.

Other investigators have observed similarities between the visions induced by the drug mescaline¹ and those of the hypnagogic state. One of the earliest to notice this resemblance was Weir Mitchell (1896). In addition, mescaline and hypnagogic effects may summate. In our own experiments with mescaline the subjects sometimes reported intensification of their mescaline imagery before sleep. Weir Mitchell's account of his mescaline experiments shows clearly that his visions increased in vividness and interest as he relaxed in a darkened room and almost fell asleep. In the light of such observations a sharp distinction between images which are 'hypnagogic' and images which are 'mescaline induced' becomes somewhat artificial. Mescaline on the one hand, and progress towards sleep on the other, both produce imagery; and the two 'types' of imagery resemble each other closely. The similarities of content may also be noted. It is of some interest that Klüver (1942) cites a case of a mescaline vision which reappeared two years later as a hypnagogic image.

Experiments of seeming relevance have been conducted by investigators at McGill University, Canada. Bexton, Heron and Scott (1954) were concerned with the effects of experimentally decreased sensory input on their subjects. Each individual, for twenty-four hours a day, wore dark goggles, was placed in a sound-proof room, and wore gloves with reversed cardboard cuffs which limited touch experiences. The subject lay in a relaxed position with a foam rubber pillow. As a result of these various procedures vision, audition, tactile perception and kinaesthesia were greatly reduced as sources of sensory input. The experimenters report that subjects found the experience so unpleasant that, despite their being given lavish payment, it was difficult to induce them to continue the experiment for more than two or three days. Among the psychological effects produced were a number of visual phenomena that invite comparison with hypnagogic visualizations. The last fourteen subjects were questioned about these phenomena: all had the imagery and all described the experience as new to them. Some reported lines, dots and simple patterns; others 'wall-paper patterns' and isolated figures or objects; more

¹See Chapters VI and VII. Elsewhere a more detailed comparison between mescaline-induced and hypnagogic imagery has been attempted in the light of their similarities and differences. (Ardis and McKellar 1956.)

complex still were integrated scenes. Illustrative reports quoted by these investigators include 'a row of little yellow men with black caps on and their mouths open'; 'prehistoric animals walking about in the jungle'; and 'a procession of squirrels with sacks over their shoulders marching purposefully across a snowfield and out of the field of vision'.¹

The subjects stressed the vividness of the imagery and their inability to control it. Thus one subject when trying to image a pen saw 'first an ink blot, then a pencil, a green horse and finally a pen'. This quality of autonomy has been seen to be a fundamental and central attribute of hypnagogic imagery. Hallucinations of senses other than vision were also reported. While the investigators do not refer to 'hypnagogic' imagery, the experiences described closely resemble those reported by our subjects in the hypnagogic state. This resemblance suggests that a withdrawal of sensory input, which naturally tends to occur before sleep, may be an important factor in evoking hypnagogic images. Such related experiences, and the deviant cases of images that we have included under the category of 'hypnagogic', are evidence for the poverty of our vocabulary in this field. This lack of adequate naming will be apparent also with experiences discussed in the following chapter, in which some of the phenomena described have names, while others—perhaps equally interesting—require not only accurate description and investigation in terms of their incidence, but also mere naming. We shall pay particular attention to the researches of Galton which themselves provided, or stimulated others to provide, most of the information we possess in this field.

¹ Bexton *et al.* 1954, p. 74.

CHAPTER IV

SOME TYPES OF INDIVIDUAL SUBJECTIVE EXPERIENCES

Any incongruity is quickly noted, the visions are found out and discredited, and are no further attended to. In this way the natural tendency to see them is blunted by repression.—FRANCIS GALTON.

As we have seen in the cases of ordinary and hypnagogic imagery, an experience familiar to one person may be quite foreign to another's mental life. There exists also a wide variety of other subjective experiences, known to some of us but lacked entirely by many people; and their occurrence or non-occurrence throws an interesting sidelight on the problem of originality in thinking. Somerset Maugham in his autobiography, *The Summing Up*, discusses creative thinking from this standpoint: 'We start by living, each one of us, in the solitariness of our own minds. . . . The peculiarity of the artist is that he is in some particular different from other men, and so the world of his creation is different too.' Maugham then points out that an artist's talent will be acknowledged 'when the picture he draws of his private world appeals to a certain number of persons, either by its strangeness, its intrinsic interest or its correspondence with their own pre-possessions'. But as private worlds differ, so will readers differ in their appreciation of an artist's work. 'There are', adds Somerset Maugham, 'others to whom this idiosyncrasy does not appeal . . . and they will deny his talent.'¹

In this chapter we shall examine the variety of what we shall call 'imagination experiences' and show how their incidence or absence may affect assessments of originality—since the author of a thought product may be subject to one of these experiences and hence impress by his originality a critic who is unaware of its existence. Some forms of imagination experience such as *déjà vu*, hypnagogic imaging, and the impression of 'falling' when dropping off to sleep, are relatively common. Others like synaesthesia, number forms, and (adult) eidetic imaging are rarer. Only some of these experiences are named. Others we can do no more than

¹Maugham 1938, p. 78.

describe, while on occasion suggesting tentative names. Further, it may be noted that people subject to them may vary widely in their reactions to imagination experiences—both their own and others. Possible reactions include surprise, alarm or terror, enjoyment or amusement, a leaning towards supernatural interpretation and objective interest.

Some imagination experiences are so highly autonomous that their author has virtually no control over their occurrence or their content. They seem to emerge from his unconscious and may appear to him to come from 'outside' or from some 'inner' source. Yet what is autonomous or unconscious depends as much on past and present perceptual experience as does any other source of knowledge. It simply comprises material that has been forgotten, as opposed to material that can be recollected and which the thinker *knows* he knows. It is necessary to reassert this before considering the various imagination experiences as part of an individual's mental equipment upon which he can draw for the construction of his thought products.

When Galton was investigating ordinary imagery he found that many people denied all knowledge of it. They had 'no more notion of its true nature than a colour-blind man, who has not discerned his defect, has of the nature of colour . . . and naturally enough supposed that those who affirmed they possessed it were romancing' (Galton 1904, p. 58). This reference to a colour-blind man's intolerance of colour-sighted people is extremely pertinent to our discussion. From time to time one encounters a colour-blind person whose attitude towards the percepts and resulting thoughts of those unlike himself is sceptical, and thus closely parallels the mutually defensive reaction that imagers and non-imagers may exhibit towards each other. Such a case of colour-blindness will be examined to illustrate the effect a man's subjective experience can have upon his thinking and how he may react to the thought of others different from himself.

The individual studied is highly intelligent, has a scientific training, and occupies a senior university lecturing post. His colour-vision defect is of the deutanope type; that is, his difficulties are mainly in distinguishing green from uncoloured stimulus objects. The concepts that resulted from this colour defect were interesting because they produced classifications of colour very different from those of a normal subject. During a sound-recorded

interview lasting about an hour a number of colour vision tests were administered. He matched a 'sea-green' skein of wool with a grey one, and when challenged said: 'I can see they are not the same but they're not *very* different.' He then matched a desaturated green with a desaturated red, and called another desaturated green 'white'. An argument occurred when the subject defended his assessment of one skein as 'black' against the writer who saw it as dark green. He was perfectly well able to distinguish between yellow and blue, but could form no adequate concepts for green and red. Moreover, he found it difficult to appreciate, from the standpoint of his own subjective experiences, that people with normal colour vision recognized a difference between greens and greys, as prominent as the difference he himself could see between blues (or yellows) and greys.

His after-sensations were of interest; for though they were seen normally following exposure to blue and yellow stimuli, there were no after-sensations following green and red. He reacted with more than usual hostility to the notorious inadequacies of colour-naming; and some of his opinions about visual art appeared to derive from his colour-blindness and the resulting lack of proper colour concepts. As might be expected, he preferred paintings that depended largely on form and outline to those in which colour played an important part. Florentine paintings, for example, appealed more to him than those of the later Venetian school.

It was evident that he thought mainly in terms of 'brightness' (black—white—grey) rather than 'colour' when greens were involved, and to some extent more generally. Like Galton's non-imagers, he reacted with surprise and disbelief towards subjective experiences markedly different from his own, showing some incredulity when the experimenter reported the presence of a very dark or very light green stimulus. Because of his faith in his own subjective experiences he was quite ready to believe that others were 'romancing' when they said they could perceive such qualities.

This case is on the whole a-typical. Most colour-blind people, once they have become aware that their subjective experience of colour differs from their fellows', can fairly easily allow for this fact in their daily lives. Adjustment to their individual subjective experience is helped, moreover, by the fact that its basis is known and that it has an accepted generic name. But it was not

always so. In 1798 the physicist John Dalton wrote a paper of some historical interest describing the then unnamed oddities of his own colour perception. 'Woollen yarn dyed crimson or dark blue is the same to me', he wrote. 'Red and scarlet form a genus for me totally different from pink . . . the face of a laurel-leaf is a good match to a stick of red sealing-wax.' (Dalton 1798, pp. 104-5.) Dalton's colour-blindness was of a different kind from the case just described, though both show somewhat parallel deviations from normal modes of thought about colour. The special interest of Dalton's paper lies in the fact that he described an idiosyncratic subjective experience which as yet lacked a name, investigated it by introspection, and realized that it affected his concepts of thought.

We may now return to those other types of individual subjective experiences which—unlike colour-blindness—have no known specific physical cause, and which we have called 'imagination experiences'.

TABLE III

COMPARATIVE FREQUENCY OF INDIVIDUAL SUBJECTIVE EXPERIENCES

(182 Aberdeen University students: 75 male, 107 female)

	Cases	Per cent.
The 'falling experience'	144	75.87
<i>Déjà vu</i>	126	69.23
Hypnagogic imagery	115	63.18
Hypnopompic imagery	39	21.42
Synesthesia	39	21.42
Diagram forms	14	7.69

Colour associations 39 20.41

(191 Aberdeen University students: 81 male, 110 female—
a group similar to but not identical with the above.)

Déjà vu. Probably few professional psychologists have not, at one time or another, reassured a friend or acquaintance *merely* by providing a name for the *déjà vu* experience. Yet this is one of the commonest of the various named imagination experiences; among those investigated by the writer and his colleagues it proved to be rather more common even than hypnagogic imaging, being reported by 126 of the student group of 182 (69.23 per cent.).

Déjà vu is an illusion of recognition, a feeling of 'having lived through this before' while knowing that one never has. As illustration we may quote one subject who said: 'When I *first* visited Dunottar Castle, as I entered it I felt sure I had been there before and I knew what I should see next.' With some people the experience is recurrent, as in the following case: 'I feel I know what is going to happen a moment before it actually does—also what a person is going to say. In the latter case I feel I know each sentence before it is said, but on one occasion a whole conversation seemed to flash through my mind before it was spoken.'

In the field of *déjà vu* the tendency for beliefs to distort testimony should be borne in mind; moreover, *déjà vu* experiences make good stories and, like all good stories, often improve a little in the telling. Such experiences are sometimes supernaturally interpreted as recollections from a previous life. Various alternative, more scientific explanations have also been advanced; but it is probable that none of these covers all instances of *déjà vu*. Here, as sometimes happens in psychology, the same kind of phenomenon occurs for *different* reasons: perhaps in one instance because contemporary events resemble previous events, perhaps in another because of their resemblance to a previous dream or previous reading. But we are not concerned with contributing to the theoretical explanation of *déjà vu*. We would merely stress that the phenomenon occurs, and very commonly indeed; and that it provides fruitful subject matter for a variety of thought products. Personal experience or reports of *déjà vu* are easily available as subject matter for beliefs about reincarnation, precognition, the serial universe, and the like; and writers such as J.B. Priestley have written plays and stories round such themes.

Body schema experiences. Another group of subjective experiences comes under the head of 'body schema', a term denoting the concept held of one's own body as an object occupying space. Changes in the size or other characteristics of the body are a familiar theme in fairy stories and folklore. The same theme is apparent in some of the world's great literature; for example, Lewis Carroll's Alice experienced some alarming increases and reductions in size. Again, in the psychoses, delusions of bodily change may develop. (Cf. Chapter VII.) It is not difficult to find subject matter for these various thought products in experiences with which some people may have personal acquaintance. We shall

be concerned later with the part that biochemical processes may play in inducing body schema changes. In the case of Alice's experiences it is interesting that, as Lippman (1952) and Bexton *et al.* (1954) have pointed out, body schema experiences occur in migraine, from which Dodgson is known to have suffered. Lewis Carroll may, therefore, well have had imagination experiences not unlike those which Alice underwent.

Lancaster (1954) found that body schema experiences occurred in thirteen of a group of forty-one patients attending a psychiatric outpatients' clinic; five of the experiences related to the hypnagogic state, and for the group as a whole size increase (eleven cases) was commoner than size decrease (four cases). We have seen that body schema changes can also occur in hypnagogic and hypnopompic states apart from any conditions of a pathological kind. Thus one subject reported a hypnagogic experience in which, she said, 'I used to diminish in size till I was nothing—I felt I was hard like a stone—it used to frighten me and I had to call my parents.' Another described this recurrent hypnagogic body schema experience: 'All my body size was swelling like a balloon and I was being held together by thin bands of string in place of bones.' The most common condition within the range of normal experience for these body schema changes appears to be this 'falling asleep', hypnagogic state. The same type of phenomenon also occurs, though rather rarely, with ordinary fatigue. One of our subjects reported: 'When overtired I occasionally feel as if some part of my face, e.g. nose or ears, has become much larger than normal.' These happenings represent another category of experiences available to some—but not all—individuals, as subject matter for their imaginings and other thought products.

Colour association. Another kind of a-typical imagery is colour association. This association is often with days of the week: 'When I think of Sunday I see dark red; Monday is brown; Tuesday pale blue; Wednesday red-blue; Thursday dark royal blue; Friday yellow; and Saturday white.' Other people have colour associations for months of the year, the seasons, numbers or, as in the case of one of our subjects, for letters of the alphabet: 'A, green; B, white; C, blue; D, red; E, white', and so on. Another had associations for languages: 'For example, German is red and French yellow.' It is by no means unusual to have colour associations within several of these fields; for some people on the other

hand, the experience is strictly confined, perhaps to days of the week only. Individuals may also have colour associations for friends and acquaintances. The following table shows the incidence of colour associations in the group studied, together with the types of colour associations reported:

TABLE IV
COLOUR ASSOCIATIONS

	<i>Cases</i>
Months of the year	19
Days of the week	13
Numbers	5
Names (Proper Names) ¹	5
Seasons	5
Letters of the alphabet	1
Languages	1

Of the group of 191 students investigated, thirty-nine (20.4 per cent.) reported colour associations of one or more of these kinds. There was a marked sex difference, the associations occurring with 31 of the 110 female subjects (28.2 per cent), and with only eight of the eighty-one men (9.9 per cent).

Diagram forms. Some individuals experience what Galton called number forms. When they think of numbers they habitually visualize them as spatially arranged. Related experiences are 'date forms', or regular spatial images for days of the week, months of the year, etc. As in the case of colour associations the a-typical subjective experience may be confined to a single category (e.g. days of the week only), or may, as in the following example, cover a wide range of categories:

I have in my mind's eye a picture of the months of the year, each in a coloured square and joined to each other, stretching in a long waving line. I have a similar picture of the days of the week. Also I have a picture of the centuries for several thousand years B.C. up to the present day, and another picture of this century by itself. By the aid of these I do calculations involving time, and each event of history or in my life has a special place in one or other of my mental pictures.

¹One of these subjects, who also had colour associations for days, numbers and months, reported that for her 'Dorothy is a brown name, Ethel a red one, Helen blue'.

Many of these experiences are obviously better indicated by diagrams than described in words, and several such illustrations are given in this and following pages from the drawings of our own subjects. Other illustrations appear in Galton (1883) and Katz (1948).

Pear uses the term 'diagram form' to refer generically to number forms, date forms, etc. He describes several unusual diagram forms such as an algebra form used by one man without which he could not do algebra, a form for piano notes, and a form for the Ten Commandments. He mentions the case of one individual who had no less than thirty diagram forms of different kinds. These experiences appear to be the least common of the 'imagination experiences' which have been named. Our own findings

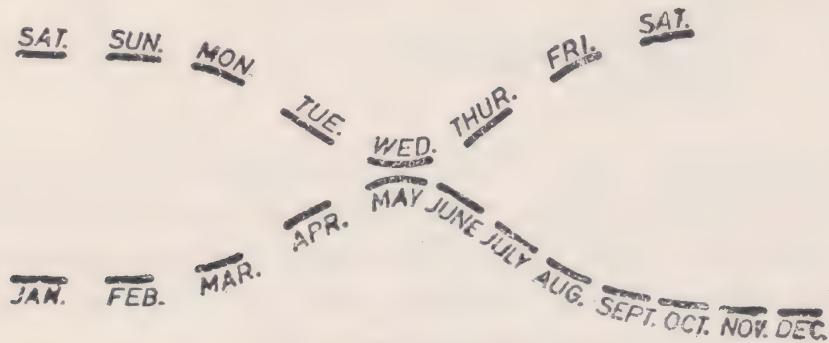


FIG 1.—Complex Diagram Form: Days of the Week and Months of the Year.

suggest that they are less common than colour associations and the synesthesia experience, and much less so than *déjà vu*. Galton (1892) estimated that they occurred in five per cent of adults. Pear (1922a) found diagram forms to occur in only 6.7 per cent of a group of 525 subjects questioned. Our own findings accord with these, though they show a slightly higher incidence, being reported by fourteen of our group of 182 students (7.69 per cent).

The relation of number forms to unusual ability to perform calculations merits fuller investigation. There appears to be evidence that some people's number forms assist their thinking in this way. Galton cites the case of a person who was able mentally to multiply fifteen figures by another fifteen by using his number form. One of Galton's most interesting cases involved an individual whose number form was of an imaged slide rule from which he could read off the correct answers to his calculations. Such experiences raise the problem of unusually clear and stable imagery more generally: for example, that of people who can 'read' from

their images of the pages of books. An amusing instance was reported by one of our subjects who experienced this kind of eidetic image in earlier life: 'I was fifteen. During an exam I "saw" my chemistry book. I mentally opened it, turned over the pages and "copied" the nitric acid diagram into my exam paper. I felt very guilty at the time.' In this case a diagram form was not involved; yet there appears to be little doubt that diagram forms are sometimes, by virtue of their eidetic quality, of substantial help to the thinking of their author in similar ways.

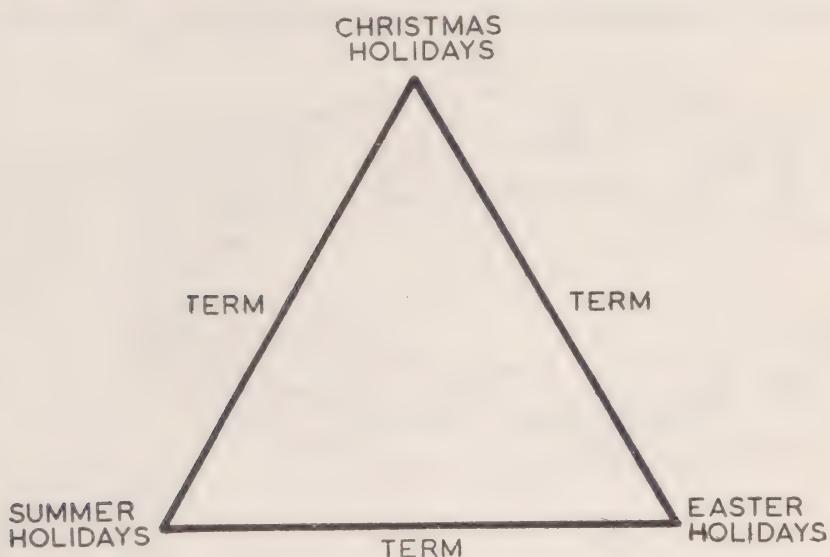


FIG. 2.—Diagram Form for the Year. 'I have always thought of the year as a triangle with Christmas at the apex away from me, and the Summer Holidays nearer front than Easter.'

There are numerous instances of well known individuals who have these types of experience. Macaulay, for example, appears to have been able to 'read' the pages of books from his own images of them. Galton refers to the 'natural fancies for different lines and curves' displayed by different individuals, and people's tendency 'to pursue their work according to definite lines and shapes'. He also mentions observations that he made of the different 'lines of search' pursued by different people when looking for lost objects. Of number forms as such he adds: 'Their diversity is endless, and the number forms of different persons are mutually unintelligible.' These tendencies deserve attention when we seek to understand the *form* taken by other people's thought products. Needless to say, such understanding is not always forthcoming from those who themselves lack such experiences. The comment

of one of our students may be quoted: 'Subject considers that any-one who arranges numbers in space and patterns, or associates things with colours, must be *peculiar*.'

Synaesthesia. In order to understand the form and content of certain thought products it is necessary to consider synaesthesia and to recognize that this subjective experience can assume an interesting variety of forms. The phenomenon is defined by Vernon (1937) as one in which 'a stimulus presented in one sense mode seems to call up imagery of another mode as readily as that of its own'. A common form of synaesthesia is illustrated by a

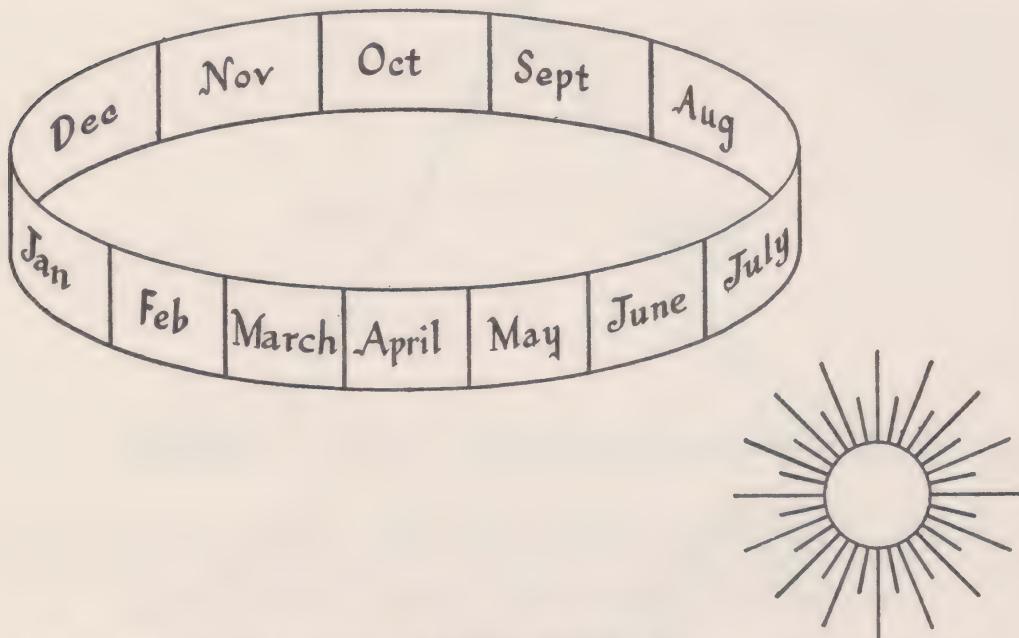


FIG. 3.—Diagram Form for Months of the Year. 'Slowly revolving . . . I am always facing into centre of circle towards opposite six months.'

colleague who reports: 'I tend to have visual images of patterns and shapes when I hear music, particularly that of Bach.' But synaesthesia do not necessarily involve an image component of a visual kind. In the following case, for instance, tactile imagery occurs instead: 'A trumpet sound is the feel of some sort of plastics, like touching certain sorts of plastic cloth—smooth and shiny—I felt it slipping.' It may be emphasized that the words were not used in any merely metaphorical sense, for the subject affirmed experiencing definite tactile imagery. Naturally occurring synaesthesia appears to be by no means as common as *déjà vu* and hypnagogic imaging. It was reported by thirty-nine of our group of 182 students (21.42 per cent).

Synaesthesia comprises imagery of one sense mode aroused by sensations of another sense mode. It has been suggested elsewhere (Simpson and McKellar 1955) that two hyphenated words might be used to denote the different theoretically possible types of synaesthesia; thus 'visual-auditory' and 'tactile-auditory' would denote the two illustrations already taken. It would help description if the first word could always denote the *imagery* experience and the second word always denote the *sensory* experience. Thus 'visual-auditory' synaesthesia—the commonest form—would mean 'having visual images', usually of shapes or colour, on hearing some auditory stimulus. By contrast 'auditory-visual' synaesthesia would denote 'having auditory images on seeing something'. This type of synaesthesia appears to be extremely rare.

		SENSORY EXPERIENCE							
		VISUAL	AUDITORY	TACTILE	GUSTATORY	OLFACTORY	KINAESTHETIC	THERMAL	ALGESIC
IMAGERY EXPERIENCE	VISUAL	-	NE	NE	N	E	E	E	E
	AUDITORY		-						
	TACTILE	NE	NE	-		E			
	GUSTATORY				-				
	OLFACTORY					-			
	KINAESTHETIC					N	-		
	THERMAL	E						-	
	ALGESIC		E						-

FIG. 4.—Types of Synaesthesia: Those types of which instances are reported in the present paper have been marked; 'N' indicates a naturally occurring, and 'E' an experimentally produced, instance of synaesthesia.¹

¹ Reproduced by permission from an article in the *Journal of Mental Science* (Simpson & McKellar 1955). Since this article appeared a number of other types of synaesthesia have been reported: for example, a psychiatrist correspondent reported in himself a naturally occurring case of kinaesthetic-auditory synaesthesia and an instance of gustatory-auditory synaesthesia during a mescaline experiment. (Professor I. P. Stevenson, personal communication, 1956.)

Despite the marked predominance of visual-auditory synaesthesia, some of the other theoretically possible types have been reported from time to time. Myers (1911) describes a synaesthesia of the visual-gustatory kind, in which the subject had 'colour experiences with tastes; these appear generally to be suggested by the colour of the tasting object'. A case of synaesthesia of the kinaesthetic-olfactory kind—imagery of movement as a result of a smell stimulus—was observed in a student by the writer's colleague, Mrs. Lorna Simpson, and reported in our joint paper cited above.

The student was doing an experiment on olfactory perception, using Crocker's Odour Standards. Given a bottle containing cod-liver oil to compare with these standards, he was unable to identify it immediately but in the course of his efforts remarked: 'This gives me a funny feeling of being on a ship.' When asked, 'Was it a visual image?', his reply was: 'No, a definite feeling of standing on a deck rolling from side to side—a kinaesthetic experience'. We accept this as a genuine instance of kinaesthetic-olfactory synaesthesia; the conditions excluded any likelihood of gross deception and the student was unaware that the experimenter had any particular interest in the synaesthesia phenomena. Other types of naturally occurring synaesthesia mentioned in the literature include the instances of visual-tactile synaesthesia in blind subjects reported by Wheeler and Cutsforth (1922).

We shall later be concerned more fully with the interesting phenomena which can be produced in experiments with mescaline. Here it may be mentioned that among the characteristic phenomena of mescaline are synaesthesias. The drug may produce synaesthesia in people not ordinarily prone to the experience and may greatly intensify the experience for those who have synaesthesia naturally. The commonest kind of synaesthesia thus produced again appears to be the visual-auditory. During one experiment, for example, the writer—who is not ordinarily synaesthetic—was listening with closed eyes to piano music played to him by one of the experimenters, and experienced vivid visual images of tiny toy boxing gloves playing on the keyboard of a piano. Experimental synaesthesias are of special interest because they sometimes afford instances of some of the other theoretically possible types which can rarely, if ever, occur naturally. Two of our subjects experienced vivid visual imagery with pain, visual-algesic synaesthesia. One of these was pricked with a sharp instrument on hands, arms and

cheek and reported: 'I've got concentric circles like round the top of a radio mast. If you touch me, jagged things shoot up; little-sort-of-jagged things, from the centre.'

The fact that the experience was not visual-tactile was verified by one of the experimenters, who found that a tactile stimulus unaccompanied by pain did not produce a repetition of the former imagery, or indeed any imagery at all. Several synaesthesias were elicited in response to temperature stimuli. One subject was touched

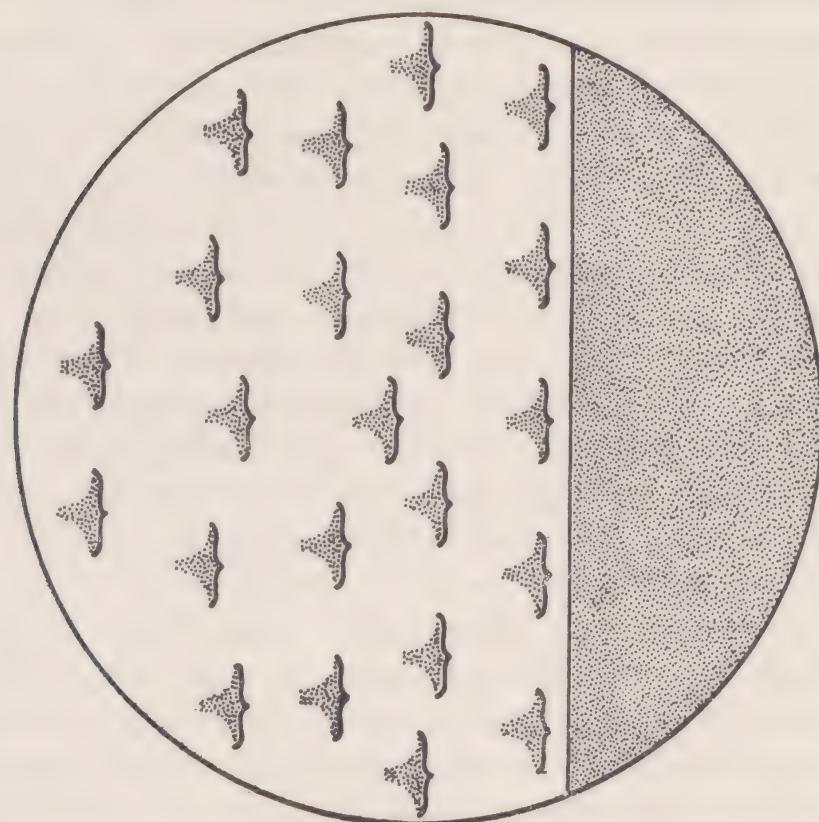


FIG. 5.—Visual-thermal Synaesthesia. Reproduced from drawing by the subject (E.D.F.) of her visual imagery. The swallow-shaped curved brackets moved from left to right.

on the left side of her face with a piece of cold metal. Visual imagery was experienced and took the form of a multiple repetition of swallow-shaped birds or curved brackets. These moved from left to right but disappeared when they reached an imaged line which vertically divided her closed-eye visual field to the right of its centre (see Fig. 5). Immediately afterwards she was asked to describe the sensation, which she reported as 'coldness'.

Various films have been made which have clearly been expressions of synaesthetic thinking on the part of one or other of their

authors. The most famous of these is, of course, Walt Disney's 'Fantasia', but several others are to be found among films produced by the National Film Board of Canada.

Synaesthetic Description. From synaesthesia proper we shall distinguish what will be called 'synaesthetic description'.¹ This might be described as the description of experiences of one sense mode in language appropriate to another sense mode. As Kerr and Pear (1932) have observed, 'the use of simile and metaphor may perhaps be regarded as the entrance door to synaesthesia'. Synaesthetic description is one kind of metaphor that may be resorted to when we wish to discuss in any detail such perceptual experiences as those of taste, smell and pain. There is a measure of agreement about certain synaesthetic descriptions which have become so socially accepted that they tend to pass unnoticed. Wines are frequently described not only as 'dry' but in such terms as 'big' and 'smooth'; and there is considerable agreement about the use of such words as 'warm' and 'cold' for colours.² There are other familiar examples of relatively agreed-upon synaesthetic descriptions. Thus some noises are said to be 'penetrating' or 'jarring', and auditory qualities are often attributed to colours. For instance, a reformed delinquent described in his Sunday paper confessions how the tie that he used to wear could be 'heard' several streets away!

Also of interest are those other synaesthetic descriptions about which there is little agreement. In their private thinking, and occasionally in their spoken words, some people distinguish different kinds of pain in terms of colour. One of our subjects who had synaesthetic experiences about pain sensations said of herself as a child: 'I used to annoy my mother. She'd ask, "what sort of pain?" and I'd say, "a yellow one".' Two facts are apparent in this incident: that synaesthetic idiom meant something very real to the thought of the child, and that it meant nothing to her mother when used as a mode of communication. It was only later that this subject gained insight into the fact of individual differences and the light it threw both on her own problem of communication and her mother's difficulty of understanding. By the time she grew up she

¹We are indebted to Dr. Elizabeth Fraser for this distinction and for suggesting the term 'synaesthetic description'.

²Thermal terms applied to colour have a certain objective basis in physical facts, for colour temperature can be measured, and that of 'warm' colours is higher than that of 'cold' colours.

had abandoned her unrewarded modes of synaesthetic communication; but she still kept her tendency towards synaesthetic thinking about pain. When interviewed she reported the pain of a burn as 'yellowish', adding 'it's more an orange yellow than a sprain'. She could imagine a 'red' pain, but never thought of pains as 'blue'. These ways of *thinking* about pain may be both useful and efficient, provided they are confined to private thinking and not used in attempts to communicate to others.

An extreme case of such highly personal synaesthetic description has been recorded.¹ The man who provided it was a musician who seems to have found it easier to think in terms of musical notes than in terms of bodily sensations. During a severe illness, after several uncomfortable nights, he said that there was 'only one position in the bed which is in *F sharp major*, and that is the only one which makes sleep possible!' This is a synaesthetic mode of thinking which is largely useless as a means of communication, although some interpretation is possible. Following his own more general theory of synaesthesia, Gombrich points out that, although a comfortable position in bed is not at all like '*F sharp major*', there is a similarity of relations. In a sense, *comfortable* is to *uncomfortable* as *major* is to *minor* in music; the resemblance is one which might well appeal to a musician and be expressed in this highly private way under the conditions of stress provided by his illness.

Kohler draws attention to the fact that language does not employ synaesthetic descriptions in a wholly haphazard way. He reproduces two meaningless diagrams, the one curved and thick, the other lean and pointed; and indicates that individuals agree closely when asked to choose which they would rather call 'takete' and which 'baluma'. Gombrich argues also that it is possible to classify quite a large number of things in terms of a two-word language. Let us take as an example Gombrich's suggested language consisting only of the words 'ping' and 'pong'. The task is to classify in terms of these two words a variety of paired things: a mouse and an elephant, an ounce and a pound, a mile and an inch, yellow and black, rubber and putty. A class of fourteen students given this task showed remarkable agreement and the results were as follows:

¹By Dr. E. H. Gombrich, in a personal communication (1955) for which I am indebted.

TABLE V

PING-PONG GAME (after Gombrich)

<i>Ping</i>	<i>Pong</i>	<i>Voted by</i>
mouse	elephant	13
ounce	pound	13
inch	mile	13
yellow	black	11
rubber	putty	10

These votes were written down by the students independently of one another. This idea and our own causal experiment suggest an interesting field for further investigation on problems closely related to synaesthesia and synaesthetic description. Kohler seems to have found similar regularities with the two drawings he used. Regularities of an inter-sensory kind seem to occur, irrespective of whether words, shapes or some other reference points such as the musical scale are used.

To summarize our discussion of synaesthetic description we may say, first, that such description is not much needed in the field of vision, where the available vocabulary is well supplied with words like 'red, green', 'light and dark', 'saturated and desaturated'. Next, that it is otherwise in such fields as those of taste and pain, where synaesthetic descriptions may be used to satisfy a want and thus become socially accepted. Finally, that more private synaesthetic descriptions (useful to a given individual's own thinking) may reveal their presence in his spoken or written thought products; and that when this happens they are inefficient as vehicles of communication.

Hallucinations. These may, and do, provide individual subjective experiences which certain people draw on for their thought products. The census of hallucinations begun by Edmund Gurney provided evidence that approximately ten per cent of people experience a visual hallucination at some time of their life (James 1905). Instances of what might legitimately be classified as definite hallucinations were reported by fourteen of a group of seventy-two of our own student subjects. It should be remembered in this context that the auditory kind of hypnagogic image in particular, and also some types of eidetic image, are quasi-hallucinatory; but neither is included in the figure quoted. Galton (1882) confesses to being impressed by the frequency with which many of his

informants, although sane and healthy, 'described themselves as being subject to "visions"'. In any investigation of hallucination it soon becomes apparent that it is not easy to decide what is, and what is not, to be called an 'hallucination'. If we classify as hallucinatory some or all hypnagogic and hypnopompic images, then 'hallucination' is an extremely common occurrence, and the census estimate rather conservative. These are, however, mainly verbal rather than factual issues.

Among the non-hypnagogic, 'broad daylight' hallucinations reported by our own subjects we may quote: 'I was stationed in a desert miles from anywhere. While writing home to my wife in my tent I heard peals of girlish laughter outside. E.N.S.A., I decided, and dashed out to see the troupe. There wasn't even a camel to be seen. This happened again a few minutes later, but never again.' Hallucinations of the negative kind also occur, as in the following case: 'I sometimes neither see, hear nor feel things that really are there. . . . I can play pieces of music and not hear a note . . . it is always suddenly that I notice sights and sounds again.'

The fact that such hallucinations are reported by some apparently otherwise 'normal' people must be emphasized if we seek to understand certain of the strange and often supernaturally interpreted events which people report that they see and hear. We may add that abnormal conditions such as fasting, sleep deprivation, solitude and the like are conducive to hallucinatory experiences. Galton (1882) mentions the spiritual discipline undergone for purposes of self-control and self-mortification by the religious mystic that has 'the incidental effect of producing visions'. This theme is dealt with in literature by Anatole France in his novel *Thaïs*.

Our present concern is with the way subjective experiences of the hallucinatory and quasi-hallucinatory kind may provide interesting subject matter for thought products, together with the phenomena of eidetic imagery which shade into those of hallucination in ways defying rigid classification. Galton (1904) points out with some emphasis the occurrence of these subjective experiences among eminent thinkers, including Goethe; and it is necessary to take account of such occurrences in evaluating the thought products of such men as William Blake. Blake appears to have 'seen' various remarkable things, and sometimes portrayed them in

poems or engravings.¹ Such things included a tree full of angels on one occasion, and God's face looking at him through the window on another. It is helpful to remember that the writer of such image-provoking words as:

Tyger, tyger burning bright,
In the forests of the night,
was subject to these vivid visual experiences.

UNNAMED EXPERIENCES

In this attempt to show the wide range of subjective experiences known to some people but not others, we have dealt first with those which have names. We have seen, moreover, that the very naming of an experience like *déjà vu* or 'hypnagogic image' may be a reassuring process. It is necessary now to notice also that numerous experiences of other kinds certainly occur, but lack widely accepted names. For instance, some people exhibit occasional confusions between real life and dreams or the hypnagogic state. Thus one subject reported: 'If I had been invited to a party and had not gone, but instead retired to bed early, in my half-drowsy state before sleep I could almost swear that I had been at the party. I could see just what was going on.' Similar confusions seem to occur in the hypnopompic state and (as we have seen) sometimes with even more complete loss of insight. Such loss of insight occurred in the case of our subject who—while still in bed and half-awake—would imagine he had got up, dressed and gone downstairs prepared to start the day.

Again, individuals differ in the extent to which they can empathize—can identify with and feel themselves into other people and things. Capacity for empathy has sometimes been thought to be a desirable quality for adequate appreciation of art. Some people, however, have experiences of a kind for which the term *excessive empathy* seems appropriate, as in the following case: 'When anyone describes a pain, toothache, etc., I experience the pain of toothache for a few minutes. When someone grinds a knife against a stone I get an eerie sensation as if the knife were cutting me.' Parts of this individual's experience might be termed 'eidetic imagery' of the pain sense, rather than eidetic imagery

¹For example, in 'The Ancient of Days', reproduced as a frontispiece to this book.

of the more usual, visual kind. Exaggerated empathy may play a part in the mental life of certain poets, as will be seen when we come to discuss this experience in the highly exaggerated form which may occur in experiments with mescaline. (See Chapter VI.)

One very common phenomenon, though it lacks an agreed-upon name, is the experience of 'falling and waking up with a start' when dropping off to sleep. What will be called, for brevity, the *falling experience* may be connected with some forms of hypnagogic imagery, particularly that of the kinaesthetic type. (We have not, however, classified falling experiences as cases of hypnagogic imagery.) The phenomenon proved, in our own investigation, to be more common even than *déjà vu*, which was the commonest of the 'named' experiences investigated. 'Falling' was reported by 144 of the 182 subjects (75.87 per cent as against 69.23 per cent for *déjà vu*).

A number of phenomena occur that seem to have affinities with colour associations. Galton (1882) refers to, but does not name, one of these: the regular tendency 'to connect visualized pictures with words, the same picture to the same word'. One of his subjects when hearing the interrogation 'What?' invariably experienced a visual image of a fat man cracking a long whip. An instance of this phenomenon, for which we have suggested the name *imagery associations*, has been discussed elsewhere in its possible relation to Freud's concept of 'concealing memories' (McKellar 1952, pp. 197 f.). A similar phenomenon noted by Galton is the tendency of some people to associate character traits with numbers. As in the case of colour associations there is little agreement between individuals in these associations; a number like '3' may be 'a good old friend' to one person and 'treacherous' to another. An exception to this is the case of the number '12' for which, Galton found, most people who have the experience tended to show respect.

Under conditions of fatigue some normal people undergo subjective experiences resembling the pathological. Fatigue may produce *exaggerated perseveration* and blockages of thought of a kind reminiscent of some forms of psychosis; such phenomena are discussed with particular reference to experiments with nitrous oxide in Chapter VI. A lengthy period of sleep deprivation may result in hallucination, as experiments in this field have shown. (Edwards 1941.) Fatigue, sleep deprivation and the hypnagogic

state may summate in their influence to produce effects of this kind. Several individuals have reported to the writer how, after a long period of night driving, they have hallucinated approaching cars and other things. The hypothesis might be advanced that with fatigue (and/or sleep deprivation) the already indistinct frontier between hypnagogic imagery and hallucination becomes increasingly blurred.

We may mention other types of visual phenomena which occurred to a few individuals among those investigated. One of them reported that under conditions of visual fatigue *size changes* in his percepts would occur on occasion: 'After studying hard or engaging in any activity which entails constant or severe strain on eyesight, everything appears smaller though no less detailed, as if seen through the wrong end of a pair of binoculars.' Reductions of size ('micropsia') involving the imaged objects is a very common occurrence in hypnagogic imagery. No cases of the reverse phenomenon of 'macropsia', which as we have seen also occurs hypnagogically, was reported by our subjects under conditions of fatigue. Among other visual occurrences connected with fatigue were several that are reminiscent of happenings in epileptic and migraine attacks. The following fatigue reaction resembles a visual epileptic aura: 'Sitting and meditating on a subject, I have often seen flashes of light appear and disappear in quick but continuous succession in the air.' Another subject reported a similar experience and others have reported visual *aura-like experiences* in the hypnagogic state.

The range of subjective experiences of which normal human beings are capable is very wide indeed when we take account of individual differences. It is widened still more if we accept as 'normal' the altered mental states which fall within the range of normality such as sleep and the dream; the hypnagogic and hypnopompic state; emotional stress; fatigue and sleep deprivation. Finally it may be legitimate to add the experiences undergone by those to whom certain general anaesthetics like nitrous oxide have been administered for medical or dental purposes.

It is suggested that any one of these experiences, and numerous variations of them which we do not happen to have observed, may find their way into human thought products. When people write, draw, paint, or speak, they naturally make use of their own personal experience and the reported experiences of others in shaping the

content and form of their thought product. Thus, as Pear (1935) has noted, the heroine of Aldous Huxley's *Two or Three Graces*, besides being addicted to visual imagery, possessed a number form. There have also been literary arguments between those who have and those who lack colour associations. One such argument followed Dame Edith Sitwell's use of the expression 'Emily-coloured primulas'. The poetess herself explained that by 'Emily-coloured' she meant pink, but it is hardly surprising that she was misunderstood. One correspondent said that 'Emily-coloured' suggested to her the tang and colour of white pepper; another said 'Emily' was yellow; and a third described the name as mauve!

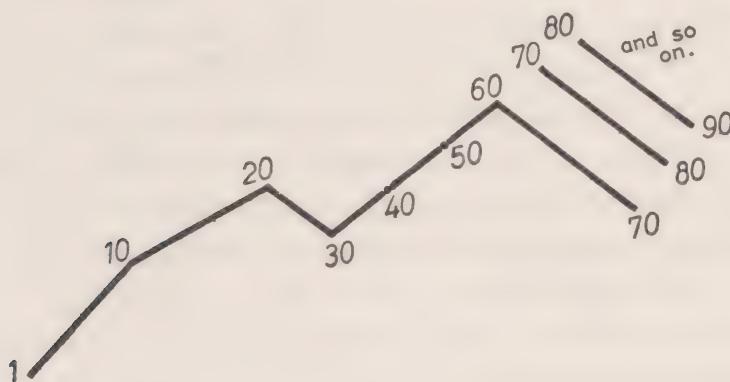


FIG. 6. Diagram Form for Numbers.

Anyone may have access to subjective experiences that fall outside the range of those to whom he would communicate his thought products.

Alternatively, people may assume an identity of subjective experience which is not in fact present. Several of Galton's number formers, for instance, assumed that everybody had number forms. The modern children's writer, Miss Enid Blyton, who composes her stories from cinematographic eidetic imagery of an unusual type, assumed as a child that other children also experienced such imagery. (Personal communication 1952: see Chapter IX.)

Our knowledge of many of these imagination experiences today is as primitive as was the knowledge of colour-blindness before 1798, when Dalton first recorded the oddities of his own colour vision. A picture painted by someone like Dalton (who perceived red sealing wax as the same colour as laurel leaves) might strike a person with normal colour vision as non-representational

and perhaps 'imaginative'. We have little knowledge of either the personality or perceptual equipment of great artists and thinkers of the past. Yet a few facts which illustrate our theme are known: that Lewis Carroll and Edgar Allan Poe made use of hypnagogic material and that Wagner, at least once, composed music from similar source material.¹ The eidetic imagery of Macaulay has been mentioned; and the part which hallucination has played in human thought products has probably been a quite substantial one. The elongated figures which occur in El Greco's paintings have sometimes been attributed to visual defects of the artist. Although this explanation is improbable, it is interesting to note that similar distortions of the human shape sometimes occur to the perception of subjects to whom mescaline has been administered. (See Chapters VI and VII.) The possibility that some artists have had visual defects, or perhaps abnormal biochemical body composition, is one that cannot be excluded. Finally, it may be stressed that only some of these experiences have names and that often these names are technical and are known only to relevant scientists. Such experiences have many variants and shade endlessly into one another. They are the more interesting in that each helps to define someone's individuality, and each may influence his thought products.

¹ In the overture to *Das Rheingold*.

CHAPTER V

PERCEPTION AND THINKING

Let no one say I have said nothing new: the arrangement of the material is new.—PASCAL.

In this chapter we shall discuss the influence of perception on the *form* of thought products as well as its relation to their content. Perception provides the raw material out of which thought products are forged. The truth of this statement is readily apparent in the case of recollections, though even here there may be considerable discrepancy between the percept itself and what is remembered of it. Yet the products of waking, dreaming and hypnagogic imagining also derive, as we have seen, from perceptual experience. The same applies to inventions and other socially useful thought products such as works of art and scientific theories. We should regard these as differing from recollection in showing a greater amount of rearrangement of the constituent perceptual experiences. Thought products in general are the result of previous perceptual impressions organized into arrangements, and the form of these arrangements is provided either by the original perceptual content or by relationships abstracted from other perceptual contents.

If this analysis is correct, then in a sense Pascal is right; an act of thinking *can* be original, *can* say 'something new', even if it merely provides a *form* that is new for the subject matter in question. The theory is defended also by Koestler (1949) who argues that 'the "eureka" process' does not consist in inventing something out of nothing, but in a bringing together of the hitherto unconnected'.

Perception itself may contribute substantially to the process of rearrangement and reorganization. We are constantly engaged in abstracting relations from one clearly perceived context and applying them to another subject matter. In his discussion of this aspect of original thinking Spearman takes as illustration the discovery by Harvey of the circulation of the blood. Harvey was led to this discovery by his observation of the way in which the valves of the human veins resemble the valves of a pump. Spearman uses

this incident as a basis of his theory of creative thinking and of the limits within which it is confined. A thinker observes a relation between A and B, and his observation leads him to conceive of the possibility that the same relation will hold between P and Q. On Spearman's view this process represents the prototype of creative human thinking; the transplanting of a relation to other subject matter represents 'the utmost to which the human mind can under any conditions possibly attain' (Spearman 1930, p. 26).

The process of abstracting and transplanting a relation may be examined in terms of analogy and of its role in human thinking. When 'explaining' something we frequently model our argument round familiar objects or events. One may, for example, try to explain the structure and function of the human eye by referring to its numerous similarities to a camera. Pumphrey (1954) has analysed the not wholly different process whereby great religious and moral teachers have sought to convey their message in parables, expounding the unknown in terms of the known, the complex and unfamiliar in terms of the relatively simple and familiar. The use of implicit analogies (metaphors) or explicit analogies (similes) is basic to almost all human communication and human thinking. In order to communicate at all with others a man must draw upon his own perceptual experience, and if this communication is to be successful he must choose perceptual experience he knows his audience also has undergone. The process is more easily detected in the case of popular exposition than in that of technical discussion and more easily noticed in the communications one makes to others than in one's own private thinking. We may regard this use of implicit and explicit analogy from perceived objects or events as a sort of core round which a thinker models his thoughts and his communications. And here we must repeat our contention that original thought *always* depends, both for its form and for its content, on past perceptions, and quite often on past perceptions of a very concrete kind.

MENTAL MODELS

The term 'mental model' will be used to denote the more or less explicit figures of speech—the analogies which are used to assist thought, understanding and exposition. It is characteristic of mental models that they refer to concrete objects, situations

or other areas of knowledge with which a thinker assumes his audience to be acquainted. Lord Kelvin, who was quite explicit about the processes of his own scientific thinking, appears to have been one of the first to use the word 'model' in this connection: 'I never satisfy myself until I can make a mechanical model of a thing. If I can make a mechanical model, I can understand it.' (Quoted Bridgman 1948, p. 45.) It is perhaps a matter of minor importance whether the models that assist scientific thinking (and at times impede it) are actually constructed or are merely imaged or otherwise thought about. Nor are they necessarily mechanical, although they often are in scientific thought; so much so, that Eddington (who dislikes all 'mechanistic' ways of thinking) describes the Victorian scientist in search of explanations as having his ears 'straining to catch the hum of machinery' (1933, p. 209).

As an illustration of mental models in science we may take Hebb's analysis (1949) of the difficulty that physicists encountered when confronted with two apparently incompatible theories of light. Hebb suggests that the opposing theories represented the question: 'Is light like a shower of pebbles, or like ripples in a bathtub?'. He further argues that the ultimate answer—that it is like *both*—was difficult to accept precisely because there is nothing in common experience that has the properties of both. The controversy may be regarded as a highly elaborated version of the familiar process of seeking to understand the unknown and complex in terms of the known and simpler. Or it may be described as an attempt to apply two different concrete perceptual experiences (the models) to a single abstract conceptual problem. Another instance from the history of physical science is provided by Lord Kelvin's defence of the concept of 'the aether'. He maintained against his critics that the concept gave him little difficulty. He likened it to 'Burgundy pitch' or 'Scottish shoemaker's wax', a substance that can be forced into the shape of a tuning fork and made to vibrate, but nevertheless also permits solid objects to fall through it. The scientific concept of 'aether' had, Kelvin suggested, been given precisely these two qualities and therefore, to him, presented 'no greater mystery'.

Models in human thinking have been likened to the 'new models' of dress designers (Zubin 1954), and the idea of fashion or 'mode' applies to both sorts of model. The Industrial Revolution provided nineteenth-century thinkers with models not

available to their predecessors; for thought, however creative, remains tied to the possibilities of perception. Over and above the general danger of false analogy—that the model chosen may be inappropriate—models involving machines that have become either obsolete or over-familiar can perform an adverse function; they can limit and handicap our understanding or acceptance of the ideas they carry. Mechanical models, like dress models, tend to 'date'. Thus Grey-Walter (1951), writing of brain functioning, argues (as have others) that we should abandon the idea of a nervous system as resembling a telephone system, and contends that this conception should be replaced by the more modern, more appropriate analogy of a 'totalisator', which the brain resembles in so far as it works out the odds for one set of responses rather than another. In the same way one of Freud's biographers has suggested that he tended to treat his concept of 'libido' or sexual energy 'like so many ergs and kilowatts'. She even employs the analogy we have drawn between dress models and mechanical models when she adds that much of Freud's most important thought was 'cloaked . . . in garments unfashionable to the modern eye' (Puner 1949).

Fashion, then, and time more generally, influences the choice of scientific models. They also help to determine the content of a psychotic patient's mind. Spearman (1930) has stressed the increasing part played by a subject matter of electrical and scientific apparatus in psychotic delusion and (we may add) hallucination also. Today rats, cockroaches and vermin of all sorts figure less prominently and are largely replaced by radar, wireless waves and inter-communication systems as the content of delusion and hallucination.¹ The modern thinker shares with the modern psychotic access to all these complex mechanical, electrical and electronic models. His analogies have outgrown the cog-wheels and electric charges of Victorian thinkers, and he now has at hand a much larger supply of ready-made systems of relations. The extent of this repertoire and its widespread availability will be more readily understood if we distinguish between two different categories of perception.

¹A clinical psychologist colleague reports that atomic warfare and the hydrogen bomb now figure in the content of neurotic responses. He has observed their occurrence, for example, in the results of sentence completion tests administered to severe neurotics of the 'habitual worrier' kind. (Webster 1955, personal communication.)

The two kinds of perception between which we must distinguish may provisionally be called 'primary' and 'secondary'. To illustrate *primary perception* we may instance seeing a table, hearing a bomb fall, and feeling the pain of being scratched by a cat or stung by a bee. Corresponding *secondary perception* would be seeing a picture of a table, hearing a sound recording of a bomb falling, and listening to a description of the event by one who has been scratched or stung. In the case of a primary perception there is immediate, direct experience of the object or situation; in secondary perception there is something intermediate between the subject and the object or situation perceived.

SOURCES OF SECONDARY PERCEPTION

Until this century the most important sources of secondary perception were the spoken and printed word, pictures, drama, diagrams, and photographs; and these between them enormously enlarged the subject matter of thought products. Historians, for instance, made imaginative reconstructions of events they had not seen. Thucydides vividly described the Sicilian expedition; Macaulay, the siege of Londonderry; and Churchill the Battle of Jutland. Among novelists, Arnold Bennett in *The Old Wives' Tale* built up from newspaper reports so realistic a description of a public execution that he was long believed to have witnessed it himself. Secondary perception also plays a large part in thought products conspicuous for their originality and component of autonomous thinking. As Lowes (1927) has pointed out, Coleridge when he wrote *The Ancient Mariner* had never crossed the Channel; yet because Coleridge's memory was 'stored with the spoils of omnivorous reading' we find in his poem 'the authentic splendours and terrors of the polar ice'.

It will be evident that secondary perception provides a vast enrichment of perceptual possibilities, and thus ultimately of the form and content of human thinking. It enables an individual to have perceptual experience of objects and events that are remote in space and time. It permits that accumulation of knowledge without which the progress of thought is impossible. More than this, it allows *imagination* (as well as knowledge) to become a cumulative process; for it gives us the opportunity to experience perceptually, and thus to think in terms of, purely imaginative places and events. By secondary perception we can learn about

such imaginary people as the pre-Adamite Sultans and the caliph Vathek in Beckford's novel of that name; or, to take geographical examples, about the countries of Erewhon and Atlantis and the mythical monastery of Shangri La. Yet imaginative novelists do not always locate their fancied places—as James Hilton did his *Lost Horizon* and Samuel Butler his *Erewhon*—in remote regions of the earth. Instead, a writer may choose to forge a skilful link between the familiar and the fantastic, between reality and the product of his imagining. Thus much of the horror of Wells's *War of the Worlds* depends on the arrival of his Martians among the sandy commons and suburban railway lines near Woking. And as Miss C. A. Lejeune points out, 'the final magic touch about an adventure story like *The Prisoner of Zenda* was that the adventure always started from your own front door: the train for Ruritania left from Charing Cross'. (*Observer*, 11 January 1953.) Even more striking was the achievement of Conan Doyle who forged this link so skilfully that the most ready association to 'Baker Street, London' for millions of people would be the name of Doyle's purely imaginary detective.

With the invention of the cinema, wireless, sound recording and television, secondary perception has become of increasing importance in modern thought and communication, and the scope for cumulative imaginative experience has been proportionately widened. By secondary perception we can now not only read about imaginary people and places; we can—in the cinema or our own home—hear Odysseus speaking or see the space-ship land on Mars. Such media of communication as writing, acting and painting stimulate the receiving mind into imaginative activity and engender still more imaginative forms. But modern technical developments subject us to such a bombardment of secondary percepts, many (perhaps too many) of which consist of the creative imaginings of others, that the accumulation of secondary perceptions sometimes results in saturation and stagnation.

Visual art, like literature, depends considerably upon secondary perception. The form and style of a painting may result largely from an artist's responses to the thought products of earlier artists, which have themselves derived from secondary perceptions. As Gombrich (1951) has pointed out, 'all pictures owe more to other pictures than they do to nature'. Yet an artist is not, merely for this reason, unoriginal. Like a thinker, he makes his selection from the

highly unstructured subject matter of nature, and his personality exerts a powerful influence on such selection. His personality includes his values, his sentiments and the specific traditions he has accepted from his master and other painters. The result of this personality and choice is style; and we habitually recognize the work of different artists from the style of their painting. Similar traditions operate in the case of the thought products of science and philosophy. Schopenhauer, for instance, regarded it as essential to the understanding of his own major work that his reader should first be familiar with the philosophy of Kant and with the ancient Hindu scriptures.

Thus we have seen that secondary perception enriches thought and imagination because it permits them to be cumulative. Furthermore, it widens possibilities of perception in time and space, and even in the realm of what—to primary perception—is impossible.

CONSCIOUS SYNTHESIS AND PERCEPTION

A striking feature of original thought, as we have seen, is its autonomous character. It may seem so independent of voluntary control in its mode of occurrence, form and content that the thinker has difficulty in accepting it as a product of his own mental life. He may, on occasion, attribute it to sources outside himself in his immediate environment (as in some forms of hallucination) or perhaps to some supernatural origin. In view of such strong autonomy it is obvious that an analysis in terms of a simple process of *conscious synthesis* of past percepts will not explain thought products of this kind.

Yet in our concern with autonomous thinking we must not lose sight of the fact that such conscious synthesis plays an important part in many kinds of thinking. At one end of the scale lies the 'unoriginal' examination paper already discussed, in which a student recalls and puts together information from a limited number of perceptual sources. At the other end conscious synthesis clearly plays a part in certain forms of creative and highly original thinking. For instance, a major determinant of Darwin's theory of natural selection was his previous reading of Malthus's *Essay on Population*, and his straightforward awareness of the essay's relevance to the more general subject matter of biology. Again, a

major determinant of Coleridge's *The Ancient Mariner* may well have been a conscious process, such as his intention to write a poem about the adventures of Fletcher Christian of the *Bounty*. (Lowes 1927.)

It is obvious, moreover, that conscious synthesis is often important in making a thought product socially acceptable. Unlike a dream, a work of art or scientific theory has to satisfy an audience; and conscious processes play a part in moulding autonomous thought into a form that the consumer can enjoy and understand. This is well stated by Somerset Maugham in his dictum: 'Fiction should use life merely as raw material which it arranges in ingenious patterns' (*Ashenden* 1928, Preface). There are probably large individual differences between artists in this matter, though Maugham here helps to clarify one kind of role that can be played by such processes. He goes on to suggest that something of the same sort can operate in painting: 'The landscape painters of the seventeenth century were not interested in the direct reproduction of nature. . . . They constructed a scene, architecturally balancing, for example, the mass of a tree with the mass of a cloud, and used light and shade to make a definite pattern. Their intention was not to portray a landscape, but to create a work of art. It was a deliberate composition.' The argument that the conscious intention of imposing a pattern plays (or should play) its part in such work is quite compatible with recognizing that there is a great deal more to creative thinking than processes of this conscious kind. In such a context words like 'autonomous and unconscious' and 'conscious' synthesis are relative. They refer to the creator's degree of insight into the various components of his thought product, and it is their balanced relationship that makes a work of art.

CONTEMPORARY PHYSIOLOGICAL PROCESSES

We have seen how past perceptions may be synthesized by conscious choice of analogous relationships into the thought products of scientists, painters and writers; how these perceptions (primary and secondary) help to define the content and form both of scientific 'models' and of works of art. Less obvious are contemporary physiological processes that may influence thought and provide a background to it. Yet it is impossible to write or think without being accompanied by a muted orchestra of sensations

(visual, auditory, tactile, thermal, visceral) which persist at, or beyond, the margin of consciousness. Although these influences on perception and thought are easily overlooked, they may well be important to thought products. One such influence, of peculiar relevance to visual imagining, is so omnipresent that it is particularly likely to be overlooked; even so acute an introspectionist as Galton candidly admits to having failed to notice it for a very long time.

It is incorrect to assume that visual imagining with closed eyes even in a darkened room occurs against a background of homogeneous blackness. Galton's report of the visual experiences which actually occur is historically interesting: 'I should have emphatically declared that my field of view in the dark was essentially a uniform black . . . I have found that this is by no means the case, but that a kaleidoscopic change of patterns and forms is continually going on . . . I am astonished at their variety.' (Galton 1883, p. 114.)

These luminous visual occurrences have been given various names including 'luminous dust', 'idio-retinal light', 'phosphene', and 'Eigenlicht'. There is evidence that they depend partly on processes within the brain itself,¹ but also perhaps partly upon processes within the retina of the eye. On the basis of systematic introspective study an early investigator of this field, G. T. Ladd, came to the conclusion that the framework of dream images consists of these luminous dust experiences. His introspective study includes an instance where he was able to account for a dream image—as detailed and specific as the printing on the page of a book—in terms of these luminous dust phenomena. Ladd was particularly impressed by the ever changing variety of these impressions, and wrote: 'I verily believe *there is no shape known to me* by perception or by fantasy, whether of things on earth or above the earth or in the waters, *that have not been schematically represented by the changing retinal images*' (Ladd 1892, p. 300, italics mine).

Ladd is referring primarily to the part these processes may play in determining the imagery of dreams, but the idea might well be applied to human imagining more generally. The often unexpected and highly original images occurring in the fantasy of sleep or wakefulness, or the states that divide the two, are less difficult

¹I am indebted to Dr. J. Smythies (personal communication 1956) for evidence of the importance of brain, as opposed to retinal, components, the first of which we had previously under-emphasized (e.g. McKellar and Simpson 1954.)

to account for if we recognize the influence of luminous dust phenomena; for they provide additional sources of experiences that may even exceed ordinary, open-eyed visual perceptions in their intensity. Ladd reports of himself: 'By far the purest, most brilliant and most beautiful colours I have ever seen, and the most astonishing combinations of such colours, have appeared with closed eyes in a dark room.'

Visual images of the waking, sleeping and hypnagogic states do not, then, occur against a background of homogeneous blackness, as is sometimes assumed but, on the contrary, against a changing screen of kaleidoscopic patterns, which could themselves at times suggest, if not largely determine, resulting visual images. Against such a background, imaginative activity is less likely to consist simply of free association than of highly personal interpretations of unstructured and ambiguous sense data—the colours and shapes of this activity. The situation perhaps resembles that prevailing during administration of the Rorschach ink blots or other such projective tests. Havelock Ellis, writing of hypnagogic images, has suggested that 'the eye supplies entoptic glimmerings and the brain, acting on the suggestions received, superimposes mental pictures on these glimmerings' (1911, p. 31). Such an interaction goes some way towards explaining certain unexpected and 'autonomous' features of much human thinking and imaging. Yet it is consistent with the fact that such images may none the less reactivate past perceptions and reveal information about the subject's personality, since it is his past percepts that provide his interpretations of the luminous dust. It is interesting to speculate how far luminous dust has found its way into visual art. Certain abstractionist, 'non-representational' paintings—for example some of those by Klee, Kandisky, and Joan Miro—are by no means unlike luminous dust, and may therefore in a sense be 'representational'.

Under certain conditions luminous dust experiences can be intensified. Intensification may be produced by immediately preceding visual activity such as will yield after-sensations strong enough to persist in changing form for a considerable time. Similar exaggeration may result from pressure or other 'inadequate stimulation',¹ as when 'stars' are experienced after a blow on

¹The general principle governing inadequate stimulation is that the resulting experience accords with the sense organ stimulated rather than with the nature of the stimulus.

the head. Flashes of light like these may be produced with less discomfort by sudden pressure, particularly to the lateral aspect of the eyeball of the closed eye. Under normal conditions luminous dust is seen most readily in complete darkness or with closed eyes. A mottled haze of luminous dust (continuous with that experienced with closed eyes) can be detected open eyed in twilight conditions; and it may be noticed that 'apparitions', interpreted supernaturally, are most often reported in darkness or twilight—the optimal conditions for accentuating phenomena such as luminous dust and after-sensations. Even in conditions of full daylight careful introspection will reveal luminous dust effects, again an achromatic, mottled atmospheric haze.¹ We must remind ourselves that retinal dust is so omnipresent that it was for a long time overlooked—even with closed eyes—by as curious an investigator as Sir Francis Galton himself. This omnipresence has been formulated in a general principle by William James: 'Any objective stimulus to be perceived must be strong enough to give a sensible increment of sensation over and above the idio-retinal light' (1892, p. 46). To this principle we may add that when such increment is wholly or mostly absent, as in darkness or with closed eyes, idio-retinal light is most conspicuously observable.

Certain conditions which affect the central nervous system appear to augment the vividness of idio-retinal light. The early effects of oxygen lack (produced experimentally in a decompression chamber), the effects of a small quantity of alcohol, the effects of substances like mescaline, and the early stages of experimentally administered nitrous oxide—all seem to have this in common. It is perhaps significant that hallucinations of a predominantly visual kind occur mainly in toxic conditions; and it may well be that their occurrence is upon a framework of augmented luminous dust activity. We may note incidentally that Cameron (1947) reports the tendency for 'dreamlike hypnagogic hallucinations when he shuts his eyes' to occur in cases of *delirium tremens* before deterioration to the stage where visual hallucination is experienced with open eyes.

In this chapter attention has been drawn to a number of familiar facts. Although familiar, they deserve attention; for there

¹This is difficult to notice because the extremely insignificant effects are ordinarily overlooked and become 'ground' for the strong 'figure' that real objects present.

is a difference between merely recognizing the occurrence of such phenomena and taking adequate account of them in one's theory construction. All that is implied by the strong probability that subject matter for thought and imagination has only one possible source of entry—namely sense perception—should be explored further. The importance of secondary perception has also been suggested, in that it extends substantially the individual's range of sense experience and thus permits thought and imagination to be cumulative. Yet again, in stressing the importance of the sensory components of thought we must not overlook the contemporary, or immediately preceding, sensory input arising in the sense organ itself; and this point has been considered in the case of visual functions. We have throughout been particularly concerned with the contribution of perception to the *form* of thought products rather than their content.

In the following chapters our attention will be directed to both the *form* and content of abnormal, rather than normal, modes of thinking. We shall be concerned less with the neurotic than with the psychotic, who has recently and with some accuracy been called 'the forgotten patient'.¹ Since earliest times humanitarian reformers, medical men and scientists have struggled against the ignorance and superstitious fears displayed by the sane, that have done so much to make the problem of 'insanity' more difficult. We shall examine the mental life and ways of thinking of psychotic patients in the light of such insights as scientific investigation can provide into the nature of their problems.

¹Psychotic patients are forgotten by the community even in such basic matters as adequate feeding. The average amount of money for food allocated to mental hospital patients in Great Britain weekly is considerably less than that allocated in general teaching hospitals. Yet while there is certainly too little money available for adequate care of psychotic patients, a series of contributions to *The Lancet* by Bickford (e.g. 1954, 1955) have shown that much can be done without any additional expenditure of money, granted some humanity and imagination.

CHAPTER VI

EXPERIMENTAL STUDIES OF ABNORMALITY

Mescaline produces every single major symptom of acute schizophrenia, though not always to the same degree.—OSMOND and SMYTHIES (1952).

THE thought processes of a psychotic patient may present great difficulty to those who seek to understand them. Of all psychotics it is hardest to achieve empathy with the schizophrenic; yet the 'pane of glass' said to be 'always there' to divide the schizophrenic from normal people is not impenetrable. There are several promising lines of attack on schizophrenia—or perhaps on functional psychosis in general—that seem to permit a measure of empathy with the patient and some understanding of his problems of adjustment. Three of these are of some importance.

First, it is possible to learn a great deal about even gross abnormality from observation of the normal—and this is true of thinking as of other psychological processes. Granted the numerous autonomous mental events to which the psychotic must adjust, many of his responses are not so very different from those of non-psychotics. Thus much psychotic thought and behaviour can be understood in terms of the principles governing normal mental life.¹ Secondly, much additional relevant information can be gained from studying those more autonomous mental states that still fall within the range of 'normal' human experience. These include dreams and nightmares, experiences under general anaesthetics, extreme fatigue and sleep deprivation, and the hypnagogic and hypnopompic states dividing wakefulness from sleep. Thirdly, it is possible to produce experimentally, for short periods of time, states which closely resemble psychosis.

¹The great humanitarian Pinel (1745-1826) was one of the first to put this idea into effective action when he suggested that insane patients, if released from the frustrations of their chains and other mechanical restraints, would become less aggressive and less dangerous. In 1793 he secured the release of the patients of the Bicêtre in Paris from these degrading restraints.

For over seventy years some psychiatrists and psychologists have tried to meet the challenge of the psychotic by producing experimentally in themselves states which were believed to be like schizophrenia. Early experiments of this kind were begun by Kraepelin in 1883. Four years later the botanist Lewin discovered for Western science the plant that has since been named *Anhalonium Lewinii*, from which mescaline is extracted.¹ Prentiss and Morgan (1895) were the first to begin systematic scientific investigation with this drug, which was found to produce predominantly visual forms of hallucination and a number of other interesting psychotic-like symptoms. Numerous later investigators who conducted experiments, often on themselves, were by this means able to experience hallucination, disturbed awareness of the shape or size of their own bodies, hallucinated movement of stationary objects, depersonalization and other occurrences of psychosis. Hence their principal object was to some extent achieved—to obtain first-hand acquaintance with psychotic-like symptoms and consequent insight into their patients' problems of adjustment. The general character of mescaline-produced phenomena has been well summarized by Mayer Gross (1951), who stresses the predominance of visual experiences, the tendency to hallucinate movement of stationary objects, disorders of time perception, depersonalization and synaesthesias. Most investigators have emphasized the vision-centred character of mescaline effects. As Havelock Ellis put it, mescaline induces 'mainly a saturnalia of the specific senses, and chiefly an orgy of vision' (1897, p. 542).

In 1943 a further important development occurred when Hofmann, of the Sandoz chemical works at Basle, was working with a newly-prepared substance—lysergic acid diethylamide. He took some of this by mouth. Unexpected psychotic-like symptoms occurred, and Hofmann courageously confirmed their causal connection with the drug by taking a second and larger dose the next day. In 1947 Stoll reported on the discovery in this second substance of mescaline-like effects, and described the first systematic experiments with it. Vigorous and intensive investigations with both mescaline and lysergic acid followed; and research workers thus sought to attain an understanding of psychosis from

¹Mescaline was known to the Aztecs of ancient Mexico as 'teonatcatl' and was used by them in connection with religious ceremonies to induce trance-like states and mystical experiences.

the standpoint of its biochemistry.¹ For example, in 1951 Fischer and others conducted comparative tests between lysergic acid diethylamide and mescaline; and in the same year Smythies reported the successful termination of mescaline-induced symptoms by administration of sodium succinate.

The question arises whether any substance that is chemically akin to mescaline or lysergic acid can occur naturally in the human body. In 1935 Lindemann first noted the chemical resemblances between mescaline and adrenaline; and a new impetus to investigation in this field has been given by the notable achievements of a research team working in Saskatchewan, Canada. In 1952 Osmond and Smythies published a paper which independently drew attention to the chemical resemblance between mescaline and adrenaline, and began to investigate systematically the implications of this resemblance. Two years later this research team (Hoffer, Osmond and Smythies 1954) reported on the progress of their work.

In this period they had experimented with adrenochrome, a substance first discovered in 1937, which there is good reason to believe occurs naturally in the human body as a break-down product of adrenaline. Adrenochrome was found to possess two very interesting properties: first, it resembled chemically both adrenaline and mescaline; secondly, it produced psychotic-like symptoms similar to those which follow administration of mescaline or lysergic acid. If psychosis is the result of some mescaline-like substance generated in excess, then adrenochrome may well be that substance.² It seems probable that schizophrenia may be produced in this way; or perhaps psychosis in general, as some

¹A principal difference between mescaline and lysergic acid is in their active doses. At least 0.2 grammes of mescaline are needed for experimental purposes; effects may be produced by as little as 0.0001 gramme of lysergic acid. While, of course, *all* such experiments must be done under both strict psychiatrist and psychologist supervision, mescaline is a much safer substance. The lethal dose of mescaline has been shown (in experiments on tadpoles) to be from a hundred to a thousand times larger than the lethal dose of lysergic acid.

²There are other substances, for example, harmine and yohimbine, which resemble mescaline and lysergic acid in the psychotic-like symptoms they produce and in their chemical resemblance to adrenaline. There is, however, no reason to suppose that these four or other such substances occur naturally in the human body. In this respect they differ from adrenochrome.

investigators believe—among them, the writer and his research colleagues. Much work of a biochemical kind remains to be done; for instance, on other substances which may work against this mescaline-like substance, adrenochrome. One important discovery is that of serotonin, which is known to occur naturally in the human body and appears to exhibit antagonistic action of this kind. These researches should be emphasized, as they may herald a new and biochemically-orientated era of psychiatry. The problem of psychosis, hitherto extremely resistant to scientific assault, is being attacked with a vigour and new insight not unlike that which accompanied Freud's revolutionary discoveries in the field of neurosis.

In the following pages the term 'model psychosis' will be used for brevity to denote the psychotic-like states experimentally produced by mescaline and similar drugs. Data will be taken principally from experiments conducted at Aberdeen University by the writer and his psychiatrist and psychologist colleagues, and it will be shown how certain aspects of this work seem relevant to the task of understanding pathological forms of thinking.

One feature common to the phenomena of model and natural psychoses is the difficulty of communication that they both present. Few who have taken mescaline and other such substances for experimental purposes have found the resulting experiences easy to communicate. Some of the difficulties encountered may illuminate the problems of establishing and maintaining communication with psychotic patients.

A subject under mescaline, like certain psychotics, may exhibit *blockage*: he does not speak at all. One interesting feature of such blockage is that it may occur for quite a variety of reasons. Two successive instances of blockage, which to objective observation appear very similar, may derive from totally different subjective conditions. One sort of blockage occurs for the obvious reason that the subject 'goes blank' and simply has no thoughts to express. Blockages may also arise from the opposite kind of subjective experience, that is, too many thoughts. This is very like the 'pressure of thoughts' or 'pathological pressure of ideas' that Bleuler (1911, p. 32) describes in schizophrenia. Again, blockage may result from the voluntary silence of a subject who perceives a sinister aspect in the actions or questions of the experimenters and is accordingly determined not to give himself away. Some

otherwise apparently normal people will, under the influence of mescaline or lysergic acid, react with this essentially 'paranoid' type of blockage.

Yet again blockages may result from a temporarily-induced weakness of intellectual functioning. During one experiment the subject was asked to do a fluency-of-association test, to give as many adjectives as he could in a minute. He did not respond. The observers tended at first to interpret his silence as due to an unco-operative and paranoid-like attitude. Their interpretation was completely wrong. This became plain when the subject eventually did speak and remarked somewhat pathetically: 'I was trying to think of what an adjective *was*.' Such loss of everyday words quite often occurred, especially with abstract words. The observers' misinterpretation is quite as interesting as the subject's reaction; and similar misinterpretations occur even more readily when dealing with actual psychotics who seem to exhibit blockages for a rather similar variety of reasons. Hence one value of the model psychosis experiment becomes immediately apparent. It permits careful study of these different kinds of blockage of speech and thus may provide knowledge that will help us in the difficult task of keeping in touch with the uncommunicative psychotic, by assisting efforts to attempt the *appropriate* empathy in each case.

A second difficulty of communication that emerges in model psychoses experiments results from the *complex or unfamiliar experiences* that the subject is undergoing. Sometimes he may find these experiences so interesting or otherwise attention-provoking that he either does not try to communicate at all, or thinks he has communicated when he has in fact said nothing. Various authorities such as Sullivan (1949) have described allied occurrences in schizophrenia; and it may be that preoccupation with hallucinations and other happenings of that sort explains the withdrawal of some forms of 'catatonic stupor'. It is worth noting that the unfamiliar experiences which may absorb one's attention under mescaline or similar substances range from the extremely pleasant to the terrifying or otherwise extremely unpleasant; and that both extremes apparently occur also in the natural psychoses, including the catatonic versions of schizophrenia.

The choice of words made by the subject of a model psychosis in his attempts to communicate is of considerable interest. As has

been argued in earlier chapters, communication can occur with a measure of success only when the words used refer to experiences that both the subject and his audience have undergone. Furthermore, although all words have an element of ambiguity, they have ordinarily a basis of agreed-upon and publicly accepted meaning, either to people in general or to some particular category of people. A technical vocabulary, for instance, is a set of words about whose meaning a category of people—rather than people in general—is agreed. But there are other words that have a purely 'local' meaning; as with 'family jokes', their implications and relevant associations are understood only by a small group.

These concepts of 'technical vocabulary' and 'family joke' help us to understand some of the difficulties of communication of the subjects in our experiments. Some, in trying to convey the nature of complex or novel experiences such as hallucinations, found it necessary to introduce a great many new words. One, after 0.4 gramme of mescaline, coined the word 'quadrupus' to describe a particular visual hallucination. We may quote her definition, elicited later by the experimenters: 'Something with some of the qualities of an octopus, but with four tentacles rather than eight.' This is an instance of an *experimentally-produced neologism*—a neologism being defined as 'any newly-coined word, or new use of a word or phrase, which is not sanctioned by literary or scientific canons' (Warren 1934). A neologism such as 'quadrupus', however, presents less serious danger of misunderstanding than the second kind, namely the use of a familiar word with a different meaning. Instances of this kind also occurred. For instance, during one experiment with lysergic acid the subject frequently used the word 'pink' in describing his hallucination. He eventually explained that by 'pink' he meant 'the colour of my car'; but the car in question could not possibly be described as anything but bright red.

Neologisms are associated with the utterances and thought products of psychotics, particularly schizophrenics. They tend to possess a purely private meaning, are understood by the patient himself and no one else, and are therefore useless and misleading as vehicles of communication. Hence the study of problems of communication under mescaline throws considerable light on the motives that may also give rise to neologisms in the natural psychoses. Towards the end of one experiment the writer as subject

reported to the experimenters: 'I have drawn on every concept I know and all have failed me.' Another subject declared that she meant something quite different from what she knew other people would understand to be her meaning, and added that what was really needed was 'an entire new vocabulary'. This subject was in fact extremely talkative throughout the experiment. Yet at one stage she remarked in desperation: 'I might as well be lying here and saying "ga-ga-ga" for all the amount I'm managing to get over!'

There were many statements of this sort; and it is easy to understand the temptation, in circumstances like these, to coin new words that *are* appropriate or to use familiar words with different shades of meaning. In the light of these reports of model psychotic experiments it is interesting to recall the statement of Curran and Guttman, writing of schizophrenia, that neologisms 'usually result from the patient's urge to describe his experiences, *for which purpose an ordinary vocabulary is inadequate*' (1944, p. 102, *italics mine*).

Experiments with nitrous oxide have some advantages over the mescaline experiment for the study of communication. One is that the subject can be restored to his normal state within an hour or less, and then examine by introspection the discrepancies between what he has actually said or written and what he meant to say or write. We may illustrate this use of nitrous oxide from experiments conducted by Dr. Hannah Steinberg at University College, London, with the writer as subject.¹ During one experiment the subject experienced periodic losses of consciousness. What he wrote in intervals between them showed some interesting differences between what was actually written and what he had meant to communicate. For instance, one note read: 'Prolongated solved time on subtly pre-prolongation psychological consultation!' Retrospection in the normal state about an hour later provided the following written interpretation of this cryptic statement in terms of the ideas the subject was trying to communicate:

My sense of time feels deranged and time passes very slowly. But this description does not do justice to the full complexity of what I am experiencing. In order to convey the subtlety of the experience to you at all adequately, it would have been necessary

¹I am indebted to Dr. Steinberg for permission to quote these observations and records.

for us to have discussed the *kind* of experience likely to occur beforehand. On the basis of such a talk and an agreed-upon terminology I could have conveyed more of what the experience feels like.

The term 'mental ataxia' might be suggested to denote this kind of discrepancy between what it is intended to communicate and what is actually said or written.

Other illustrations of such mental ataxia may be chosen from the same experiment. In the next example an additional complication appears; to the tendency to resort to neologistic ways of thinking is added a tendency to attribute private meanings to the words or other symbols used. During nitrous acid intoxication the subject wrote: 'I want to 20,0000000000000—I like doing this 20,0000000000000, I like writing the same thing over and over again. . . .' The enjoyment of the repetitive activity is obvious, but it is less apparent what the '20,000 etc.' is all about. This referred—in the private thinking of the subject—to experiments on oxygen lack which he had conducted some years previously in a decompression chamber. In the earlier experiments subjects had been required to write: '20,000 feet without oxygen' (this being a description of the atmospheric conditions of the chamber at the time), and had not infrequently written '20,000000 etc.', the additional noughts continuing indefinitely as a result of the perseveration induced by oxygen lack.¹ Thus the numbers used had a private meaning for the subject, namely: 'This feels very like oxygen lack experienced in a decompression chamber.' Such meaning was not, of course, apparent to the experimenter until afterwards explained to her by the subject.

It is quite unlikely that any substance resembling nitrous oxide is responsible for psychosis, yet its usefulness as an experimental tool in this field may be noted. It provides a handy and safe technique for studying mental ataxia, thought blockages and thinking involving words with neologistic and highly personal meanings. All such impediments to effective communication have parallels in one or other of the natural psychoses. It is thus possible by laboratory methods to study the processes whereby

¹These perseveration effects occur commonly with nitrous oxide. One of Dr. Steinberg's subjects wrote: 'Can't see, getting quicker quicker quicker. Can't help laughing laughing laughing laughing laughing—feel like a gramophone record record record.' (Steinberg 1953, p. 138.)

ideas—which may initially have been more or less clearly conceived—can be transmuted into apparent nonsense because powers of communication are in some way impaired.

HALLUCINATION

The hallucinations of the model psychoses are especially valuable for understanding the psychotic patient. We have seen that in dreams, nightmares, hypnagogic and hypnopompic experiences, autistic or A-thinking can dominate the mental life of the non-psychotic. Psychosis itself might well be described as an invasion of waking consciousness by an excessive component of A-thinking. A rather similar invasion seems to occur with mescaline or lysergic acid; and again, as in psychosis, hallucination is one important form that these A-thinking processes may assume. It has been suggested that much psychotic thought and behaviour can better be understood if viewed as an attempted adjustment to this fact of hallucination. The normal individual adjusts to what he sees, hears, or otherwise perceives; the psychotic likewise attempts to adjust to what he believes himself to have perceived, some or all of this being hallucination.

Experimental studies provide information about such difficulties of adjustment. The mescaline subject also may confuse his hallucinations with real perceptions, and this confusion can influence his thinking in gross or subtle ways. The hallucinations, even when recognized as subjective experiences, may still disturb the individual concerned as when, during one of our mescaline experiments, the subject could not finish the mince she had been given for lunch because of the hallucinated 'insects' she saw in it. Another subject, who had a rather similar experience under lysergic acid, ate his meal, 'insects and all', quite cheerfully. Both subjects were fully aware that the insects did not really exist. Yet, even granted such knowledge, the first individual's reaction is understandable, in the same way as certain psychotics' reactions to their hallucinations are understandable. In other experiments the subject, in a hallucinatory way, misperceived some person who was present as having changed into somebody else. For the most part insight into who was really there was retained; but it is easy to understand the marked effect on the thought and behaviour of a

psychotic who experiences such an hallucination but is not aware that it is one.

Hallucinatory experiences in mescaline experiments may operate in other and more subtle ways. Thus on one occasion lunch was delayed for everybody while the subject attempted to remove dust from her coat and skirt. The 'dust' did not yield to brushing, being purely hallucinatory, and the subject was resistant to the reassurances of the hungry experimenters as to its unreal character. If the mescaline subject's reactions are better understood when he is viewed as a person who is constantly adjusting to things that he, but nobody else, can see, the schizophrenic differs principally in that his adjustments are mainly to what he alone can *hear*.¹ Nevertheless, visual hallucinations also occur in schizophrenia, and it may well be that their incidence has been somewhat under-estimated. Visual hallucination is, of course, commoner in certain other forms of psychosis and notably those in which a toxic factor is operating, of which *delirium tremens* is the standard example.

DISSOCIATED EMOTION

Response to hallucination explains some of, but certainly not all, the psychotic's unpredictability. There appear also to be upsurges of emotion that occur suddenly and may change rapidly in their character. The patient may feel cheerful, aggressive, amused, then suddenly sad, the transition being abrupt and unexpected. Such emotional upsurges might be described as 'dissociated', in that they seem to occur autonomously and to be unrelated to environmental happenings and recent past experiences. To use the terminology of Skinner (1938), they are 'emitted' by the organism, not 'elicited' by external stimuli. It is helpful to conceive of the psychotic's unpredictability as being not necessarily responses to hallucinations, but as sometimes either attempted adjustments to upsurges of dissociated emotion or surrender to them.

¹The greater frequency of auditory than visual experiences in the case of hypnagogic phenomena has been noted. In nitrous oxide experiments Steinberg (1953) similarly found a predominance of auditory hallucination in twenty-six cases as against only nineteen instances of visual hallucination. (Total of fifty subjects).

Personal acquaintance with dissociated emotion and adjustments to it can again be produced experimentally, introspections and subsequent retrospective reports providing us with a clearer understanding of them. After one experiment with mescaline the subject said: 'The emotion was going on anyhow. . . . It almost seemed to be touch and go whether one laughed or wept.' One difficulty in understanding experiences of this kind is the fact that their nature may be masked by the kind of adjustment the subject or patient makes to them. Both may seek to rationalize their feelings in terms of whatever is going on externally at the time in the environment, or in terms of whatever hallucinations they may happen to be having when the emotional upsurge occurs. The subject already quoted commented on this, adding: 'One picked on something in one's immediate environment to explain it. One grabbed something to explain it.' It has been established that free-floating emotion of the anxiety kind plays a part in producing specific phobias, because it is on the whole more tolerable to have an irrational fear of a particular thing than to experience the emotion of fear in an unattached and diffused form. Free-floating fear was among the forms that dissociated emotion was observed to take in our series of experiments, and one subject described herself after the experiment as having been 'frightened that I could be so frightened and not be frightened of anything'. Other dissociated emotions were of very different kinds, and the following report suggests the euphoric type of autonomous emotional upsurge: 'New influx of energy—being lived through by forces I couldn't quite control, that made me feel rather comfortable.'

As has been suggested, there is a danger that these dissociated emotion occurrences may be misinterpreted: that they may be attributed to external provocation, hallucination, or some other 'cause' that the subject or the patient is only too ready to find. Awareness of this possibility has led certain authorities (e.g. Landis and Bolles 1950, p. 154) to state that emotion is not provoked by hallucination in the same way as it is provoked by external stimuli in the case of the non-psychotic. That this may well be the case in any given instance needs to be constantly kept in mind. Yet, despite the occurrence of dissociated emotions which may be rationalized, there seems no reason to reject all other possibilities as non-existent. A psychotic may sometimes exhibit distress simply because of the occurrence of

an hallucination with harrowing content, or euphoria because of a markedly pleasing hallucination.¹

A somewhat different relation between emotion and hallucination also appears to occur at times. In one mescaline experiment, at the peak of the drug's effect, the subject experienced a marked disorientation from her environment. She was taken into a familiar room and her disorientation assumed the rather concretized form of the disappearance of familiar objects—i.e. negative hallucination. She reported: 'You look for the table you were sitting at and it's no longer there!' In retrospect after the experiment, she added that such disappearances and reappearances 'went with whether I knew where I was and had things under control as it were'. In other words, when the subject felt disorientated, the environment visually changed and exhibited these disappearances of familiar reference points.² It is not difficult to understand the emotional disturbance that such disorientation and changes in the environment may produce in a psychotic.

¹The writer has been present with psychotics when precisely these emotional responses to precisely such hallucinations occurred; there seemed no reason to postulate dissociated emotion in either case. Cf. p. 16.

²Negative hallucination also occurs with nitrous oxide. Thus Steinberg (1953) reports that one subject, on looking at a friend standing against the wall, found that 'only a pair of legs remained; the upper half of the body had disappeared and the wall was visible behind'.

CHAPTER VII

PATHOLOGICAL THINKING

Have you ever seen a foreign newspaper after it has passed the censorship at the Russian frontier? Words, sentences and whole paragraphs are blacked out, with the result that the remainder is unintelligible. A 'Russian censorship' occurs in the psychoses.—SIGMUND FREUD: *Letter to Wilhelm Fliess*.

THE thinking of a psychotic may exhibit curious discontinuities. These peculiar connections, or absences of connection, have been likened to the knight's move in chess—jumping over an intervening square on the board—because of an apparent gap between where the thought begins and where it ends. To illustrate such thinking we may quote one schizophrenic patient who, when asked by the writer to explain the meaning of the proverb, 'A bird in the hand is worth two in the bush', replied: 'That could be your bank account as opposed to your income tax.' There is perhaps a *kind* of connection between the two statements, inherent in the idea of the difference between what one really possesses (bank account) and what one thinks one possesses but does not (amount of money equivalent to one's income tax). Nevertheless the connection is not of a kind likely to be used by a normal person. Despite an initial impression of discontinuity one may sometimes be successful in tracing the missing linkage. Sometimes, however, the patient does not, as it were, come to the surface often enough in his thinking for his hearers to follow his thoughts and understand his statements.

In this chapter we will consider some of the forms of thinking that occur in psychosis. As we have seen, the amount of insight an intelligent patient may possess (particularly in retrospect after partial recovery) should not be lightly underestimated; and we shall draw on several such introspections for the understanding they give us of certain types of abnormal thinking. Our second source of information will again be model psychoses produced by such substances as mescaline, lysergic acid diethylamide, adrenochrome, nitrous oxide, etc., which appear to duplicate certain phenomena of the natural psychoses. As the subject in these experiments can

introspect more easily than the patient and can also retrospect on return to normality, such experiments permit detailed study of forms which abnormal thinking can and does assume.

THE KNIGHT'S MOVE OF THE SCHIZOPHRENIC

One patient described the subjective accompaniment of what we should call *knight's move thinking* as being 'not like a street with numbers on every door'. He amplified this in a later part of the interview: 'The pictures that go through your mind! You get a picture, then another picture, but you can't get the two joined. . . . Instead of one picture there's a whole lot of pictures for just one small, wee thing.' Such a description suggests associative processes of a strongly autonomous kind, in which the patient has no control over the content of his thoughts or the order of their succession. A patient of Bleuler's spoke of his experience during a period of active psychosis as involving 'idea joined upon idea in the most bizarre series of associations' (Landis and Bolles 1950, p. 155). It is important to remember that the non-psychotic also experiences such autonomous processes in his dreams; and the hypnagogic imager will be familiar with similarly discontinuous sequences of ideas in image form. The patient just quoted could almost have been describing the psychological processes of the hypnagogic state, of which Henslow (one of Galton's subjects) gave this account: 'When the process is in full activity I feel as if I were a mere spectator at a diorama of a very eccentric kind, and was in no way concerned with the getting up of the performance.' (Galton 1883, p. 117.) The subjective accompaniment of one kind of knight's move thinking in psychosis appears to be of this type, and we have seen that some insight into its mode of functioning can perhaps be gained from the study of mental states that fall within the normal range of experience.

Such discontinuities, however, can apparently occur in alternative ways. One of these results from the fact that the patient in question is hallucinated and that his hallucinations are of emotional importance to him. For instance, one schizophrenic was asked during an interview to give the meaning of the proverb: 'When the cat's away the mice will play.' His response, although of the knight's move kind, is not difficult to interpret: 'When there's nobody about the voices are there—they'll take advantage.' In this instance,

as seems to happen quite often, the presence of other people tended to diminish the frequency of the patient's hallucinations. The reality of hallucinations to the patient himself is something to be taken account of—a fact all too readily lost sight of by the non-psychotic. It was brought home to the writer when he asked one schizophrenic to define a number of simple words, and the psychotic suddenly remarked: 'This is really a good game if people wouldn't come in with a voice.' An auditory hallucination had intervened. Such simple distraction by hallucinations which the patient alone sees or hears is one obvious determinant of discontinuities in psychotic thinking. Moreover, the content of these pseudo-perceptions may evoke thoughts that are markedly different from the associations previously operating and quite irrelevant to the questions asked.

Autonomous processes of other than hallucinatory kinds can give rise to similar discontinuities. For instance, a patient when asked to explain the 'too many cooks' proverb replied: 'Cleanliness is next to godliness, seeing is believing. . . .' The most likely basis of the linkage is not difficult to find. The response was determined not wholly by what the investigator had asked, but partly by what the patient himself *associated* with what he was asked—in this instance perhaps some such question as: 'What is another saying like that one?' The answer, as a result of this intrusion, thus becomes irrelevant to the original question. Realistic social intercourse seems to depend a great deal on ability to inhibit other ideas which are irrelevant to the purpose in hand. What one speaks may at times be only a tiny segment of the associative processes actually occurring. In an interesting passage Stekel argues: 'We never have single thoughts but always many, an entire polyphony . . . the other voices and the counterpoint remain hidden. . . . I picture thinking as a stream of which only the surface is visible; orchestral music of which only the melody is audible.' (Rapaport 1951, pp. 313-4.) Normal reality-adjusted thinking might well be viewed as a selective process, involving inhibition of subsidiary associations irrelevant to its central theme.

Under certain conditions—those of psychosis and the hypnagogic state, for instance—the ability to inhibit and control irrelevant associations seems to diminish. Mescaline experiments provide information about the difficulties resulting from this loss. One subject described herself as 'so busy chasing hares off the

pathway through the woods that I lost the main path'. Let us examine an instance of such thinking under mescaline, which is of considerable interest in relation to Stekel's polyphony of thought, and also relevant to the understanding of one cause of knight's move thinking.

This subject was asked to explain the proverb, 'Those who live in glass houses shouldn't throw stones'. She found herself thinking about a castle and eventually got round to the parable of the mote and the beam. She was, however, cautious about advancing the parable as the meaning of the proverb for an interesting reason.

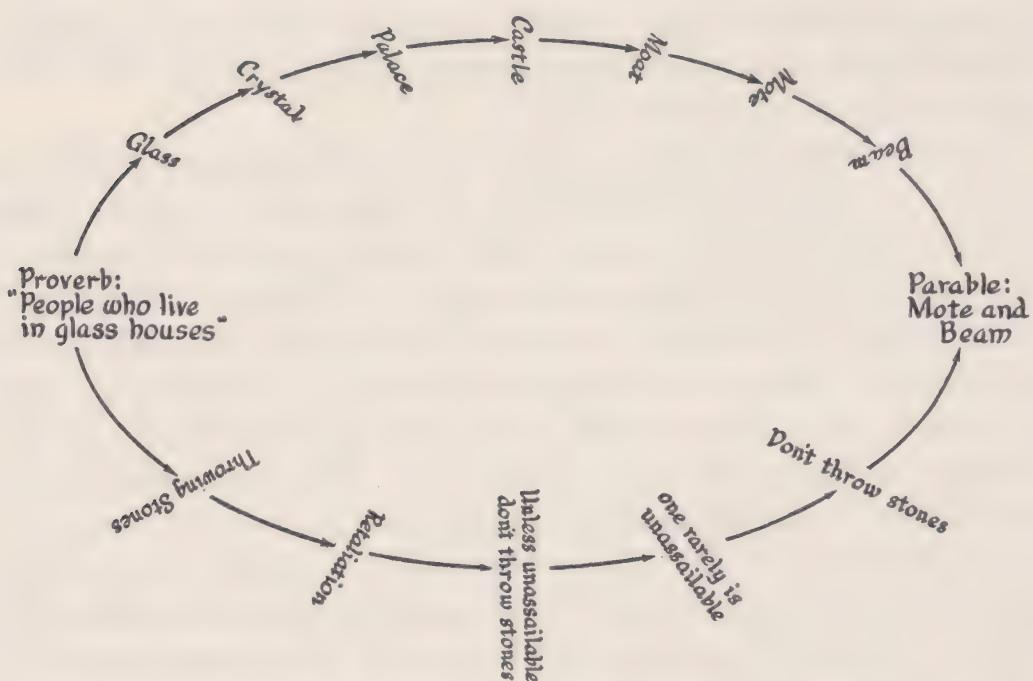


FIG. 7.—Thinking under Mescaline. 'Moat' and 'Beam' clang association involving A-thinking plus parallel R-thinking processes.

Two sets of ideas, the one set purely associative, the other logical, seemed to be operating. A logical connection of the parable to the proverb appeared to be: people in glass houses→throwing stones→retaliation→vulnerable in glass house→unless unassailable don't throw stones→one rarely is unassailable→don't throw stones→mote in own eye before beam in others' eyes.

Yet the subject was *also* able to reach the parable from the proverb by a purely associative chain of ideas: glass houses→glass→crystal→palace→castle→moat→mote→mote and beam parable. The subject commented afterwards: 'I realised that the "moat-mote" connection was logically unsound and was puzzled

to find that the idea it led to none the less appeared to be relevant.' Of her hesitation she explained: 'I began to wonder if I'd got to the "mote" via the castle in the wrong way instead of by the logical idea.'

Such clang associations, and the fact that a given word may have a range of different meanings, may account for certain of the discontinuities of logical connection occurring in both natural and model psychoses.¹ Of special interest in this case is the fact of insight into the simultaneous, or rapidly alternating, occurrence of logically sound reasoning on the one hand and autistic associative process on the other. To the understanding of such thought Stekel's standpoint seems helpful: 'The notion of thinking in a single direction is no longer tenable. I maintain that the thought process shows a remarkable condensation.' Such thinking might well be described in Stekel's words as 'a polyphony and not one voice'. He adds: 'What we are after lies in the middle voices or even in the counterpoint. Under certain circumstances the leading voice may be useless for our purpose.' (Rapaport 1951, p. 314.)

CONCRETIZATION

Reasoning, and reality-adjusted thinking more generally, seem to depend on an ability to select relevantly and to inhibit the irrelevant. Loss of this control is a noticeable quality of A-thinking in its various forms. A further quality which A-thinking tends to exhibit is displacement from the abstract towards more concrete forms, as is suggested by Silberer's analysis of hypnagogic thinking. (See pp. 45-6.) In a very important and somewhat neglected analysis of the psychology of intelligence, Thurstone (1924) has discussed concretization and abstraction. He suggests that the more intelligent ways of behaving are distinguished by 'capacity for abstraction, which is an inhibitory process'. By contrast, unintelligent modes of thought, like unintelligent modes of behaviour, lack inhibition; they are too close to one kind of specific response rather than another. Intelligent thought is inhibitory in the sense

¹Of psychotic thinking Bleuler (1911) remarks: 'The patients may lose themselves in the most irrelevant side associations.' Again: 'Two ideas, fortuitously encountered, are combined into one thought, the logical form being determined by incidental circumstances . . . clang associations receive unusual significance.'

that it has stopped short of greater concretization, and been halted at a point which still allows a wide choice from a range of alternative specific responses.

A rather casual experiment of Galton's reported by Pearson (1924) may be mentioned since it illuminates the argument Thurstone was later to develop. Galton on one occasion spoke the following words first to a young woman and then to a philosophically inclined friend: 'I want to tell you about a boat.' The young woman immediately imaged a large boat pushing off from the shore filled with men and women dressed in blue and white. The philosopher's response was very different. He declared that the word 'boat' called up no definite image—he held his mind in suspense, refusing to think of any particular boat with any particular freight, or from any particular point of view. Galton himself interpreted the incident as illustrating the tendency in men used to dealing with abstract ideas to suppress mental imagery. He adds that his investigations of imagery later provided quantitative evidence of this as a general tendency. (Pearson 1924, p. 240.)

The distinction between abstract and concrete modes of thinking, conceived of as depending on a difference of inhibition, is a useful one. A-thinking in its various forms—dreaming, hypnagogic, psychotic and model psychotic—is characterized by a decrease of the kind of inhibition to which Thurstone refers in his analysis of intelligence. As we have seen, this tendency is very noticeable in the case of hypnagogic thinking, of which Silberer wrote: 'The tired consciousness, not having at its disposal the energy necessary to normal thinking, switches to an easier form of mental functioning.' (Silberer 1909, pp. 198-9.) We have noted some of Silberer's, and some of our own, observations of such processes in hypnagogic thinking, and have also referred to the similar phenomena to which Rivers draws attention in the case of the dream (Chapter III). Our present concern is to examine parallels in A-thinking of the psychotic kind.

The inferiority of the psychotic to the normal person in dealing with the abstract is well known.¹ Recognition of this fact forms the

¹As Areti has observed, 'the autistic person has a tendency to live in a world of perception rather than in a world of conception. [His thought is] more and more related to specific instances, and not concerned with classes, groups or categories.' (Areti 1951, p. 623.)

basis of certain test procedures on the one hand, and of several well-known clinical techniques on the other. During psychological testing the psychotic's bias towards the concrete may readily emerge. Thus one schizophrenic, asked to explain what a table was, said: 'A dining-room table or an institution table . . . the table you eat on . . .' etc., and then proceeded to associate about what he saw on the table which was in front of him. Here we find a good illustration both of concretization and of weakened capacity to reject responses that are irrelevant to the situation. Responses to the psychiatrist's procedure of asking psychotics to explain proverbs tend to be similarly concrete. For instance, one patient when asked to explain 'When the cat's away the mice will play', replied that it meant: 'If nobody's in the kitchen the soup will boil over.' Another (Scottish) patient, asked to explain 'Many hands make light work', answered in a similarly concrete way: 'I canna explain that . . . that would be tattie (potato) picking.' Asked 'why tattie picking?' he replied: 'Many kinds of tatties: Golden Wonders, Kerr's pinks . . .', etc. The strong tendency to retreat from the abstract concept to the concrete instance is especially evident in this example.

Experiments with mescaline throw light on forms that such a retreat to more concrete thinking may assume. For instance, in one experiment the subject was asked: 'What do we mean when we call a woman a cat?' Her difficulties show one form that concretization can take: 'That's the trouble—I can't get beyond the image of a cat. It's not my own cat—it's a Siamese cat.' It will be noticed how readily 'cats in general' assumed the form of an inappropriately concrete image of a particular cat. Different processes of concretization operated in another experiment, when retreat from the abstract to a more concrete level involved a subject in subsidiary questions of an irrelevant kind. When asked to explain in what way a lion and a dog were alike, she was able to reply only after a period of blockage. Retrospective investigation revealed an interesting reason for the difficulty. It resulted from preoccupation with the problem of whether the sex of the animal was involved in the question or not; whether 'dog' was meant generically, or in the purely masculine sense as opposed to 'bitch'. This kind of difficulty in thinking might readily be interpreted in terms of Thurstone's theory that the ability to abstract depends upon inhibition. Because of the drug's effect the subject was unable

to inhibit associated but irrelevant ideas. These ideas intruded and distracted her attention from what, under normal circumstances, she would have known the investigator's question to mean.

In the teaching-learning situation nice examples often occur of inappropriately concrete responses. One teacher reported the case of a visiting inspector who asked the children to do a sum involving adding marbles together, and was a little disturbed when one child put up a hand and said: 'Please sir, teacher always sets our sums in apples!' The same contrast between forms of thinking of an appropriately abstract kind and those of an inappropriately concrete type occurs in logical argument. Those who are learning logic for the first time are often a little distressed by the *content* of the logical argument; by, for example, the abandon with which the professor seems willing to maintain such absurdities as 'no men are mortal', or 'all Afghans have false teeth'. It takes a little time before the student logician, like the child mathematician, is able to become appropriately abstract in his thinking. He gets used to regarding the *content* of the logical argument as irrelevant and to concentrating only on its *form*. The symbols to which the logician, like the mathematician, resorts are one way of getting over this difficulty, since one can obviously proceed without irrelevant issues about the truth or otherwise of content to make statements like: 'All A's have P', or 'some A's have not P'.

Some interesting observations were made when symbols were presented to mescaline subjects, or they were asked about the validity of arguments stated in abstract form. Thus one was presented with the following logical form: 'P implies Q; and P; therefore Q.' Asked whether this was logically valid or invalid, she seemed uninterested; but the statement itself did absorb her attention. It emerged that what interested her was the application of the argument (whose abstract form might of course be applied to *any* subject matter whatsoever) to a concrete instance, and she replied: 'This is an argument for the existence of God.' One might well say of such thinking what Silberer remarked of hypnagogic thinking, that consciousness not having at its disposal the 'energy' (or 'inhibition') necessary for normal thinking 'switches to an easier form of functioning'. (See above.) Interesting responses were also obtained to other types of symbol. When, for example, '♀' and '♂' were shown to one subject the response was that they are 'used to represent the top of St. Paul's'. More

abstract notions like 'symbol for female' and 'symbol for church on a map' did not appear to occur to her at all.

In experiments on the model psychoses, concretizations sometimes assume interesting hallucinatory forms. A rather striking case is reported by Savage (1952) when in one lysergic acid experiment the thought of food led the subject to hallucinate a cabbage, followed in turn by a knife and fork! Sometimes emotions appeared to express themselves in concrete hallucinatory forms. In one of our mescaline experiments the subject was having interesting hallucinations and did not want to be disturbed. The writer, as one of the experimenters, was equally insistent that she communicate these hallucinations and the result was a good deal of unspoken hostility towards him. At this stage the subject noticed that the various experimenters all began to look different, and proceeded to describe the hallucinated distortions of the appearance of each in turn. When she came to the writer she remarked: '*You* look small and square . . . like a cardboard image of Peter, that someone's crumpled up in the middle.' Later she admitted her accompanying hostile thoughts—that the writer appeared to her as an object which might be thrown away, perhaps into a wastepaper basket, and thus disposed of. Hostility sometimes seems to take a rather similar concrete form in the psychotic. Thus one patient during interview began to discuss the common but irritating occurrence when, after one has waited for some time in a bus queue, the conductor finds room for only the two people immediately in front of oneself. He explained the hallucinatory appearances which had recently occurred to him under these circumstances, when he found that the conductor diminished in size almost to nothing, while he himself seemed to grow so big that he could look over the top of the bus.

The psychotic's bias towards concrete forms of thinking may give rise to unreasonably literal interpretations of the words spoken by other people. Cameron (1947) gives two illustrations of this; first, how a patient, told to 'lie low', had proceeded to do this by sleeping on the floor, and, secondly, how another patient who had been asked to hold his tongue did just this.¹ Much ordinary

¹A somewhat different manifestation of literal-mindedness is illustrated by the patient, quoted by Bleuler (1911, p. 19) who was asked: 'Where is Egypt?' The answer received, 'between Babylon and the Congo', was perfectly correct though somewhat unusual.

conversation depends on the fact that we do not take too literally the words other people speak. In one of his stories G. K. Chesterton has contributed an insightful analysis of this. He takes as an example how, if a woman is asked: 'Is there anybody staying with you?' she will reply in the negative, ignoring the housemaid behind her and the butler in the corner. But if, during an epidemic, a doctor asks the same question, the woman will answer affirmatively and thus again reply according to what the questioner *means*. Impaired capacity to think in abstract ways and difficulties in distinguishing the figurative from the literal, account for certain of the oddities of psychotic thinking.

LOSS OF THE 'AS IF'

As we have seen, such figures of speech as simile and metaphor play an important part in human thought and communication. Ordinarily a person has a measure of insight into whether he means something literally or merely in an analogous way. Subjects in our mescaline experiments were very often preoccupied with this distinction, but did not always retain this insight. After one such experiment the subject reported that most of the time she was able to retain the distinction between 'it is so' and 'it is as though'. On occasion, however, she would lose insight into the difference—'but the next second I got back to the "as though"'.

As subject in one experiment with nitrous oxide, the writer had a very similar experience. After a period of inhaling a sixty per cent mixture of nitrous oxide, the mask being removed, he took some time to return to normal. He regained consciousness and found himself stating that enemies had been putting thoughts into his mind and preventing him from saying what he wanted to say. It was not an 'as though' experience, it was an 'it is so' experience, reminiscent of the kind of psychotic who attributes his autonomous thoughts (or hallucinations) to some outside hostile agency. In more normal circumstances, for example with a smaller dose of the gas, the subject might well have described the uncontrolled thoughts as 'it is as though other people were putting thoughts into my head'. With loss of insight into the difference between analogy and the literally meant, the responses assumed psychotic-like forms.

Other experiments with mescaline suggest the relevance of loss of the 'as if' to psychotic response. One subject experienced exaggerated empathy with material objects. She was able to identify herself with, and see things from the standpoint of such objects as chairs and tables. She declared that she knew exactly what it felt like to *be* a table. Very naturally she was asked to tell the experimenters, and her (sound recorded) reply merits quotation: 'I could feel the sort of pressure where your legs join the table top. I could feel what it was like looking in all directions and not facing any way—being properly symmetrical as it were—a bit to do with being wood, and having been a tree. I felt a bit what it felt like to have grown and be stuck there.' The description is a nice instance of the empathy which, according to various authorities, plays a part in certain types of aesthetic appreciation. It is relevant to our purpose to note that this 'feeling into' experience was accompanied by insight into the fact that she remained herself. She did not (in other than an analogous way) identify herself with the table.

Certain psychotic delusions involving complete identifications with various improbable objects might be explained as a similar process of a more extreme kind. (The traditional joke about the psychotic who identifies himself with a poached egg is perhaps a stereotyped recognition of this category of delusion.) Something approximating closely to this extreme psychotic empathy was experimentally produced by Hoffer, Osmond and Smythies. Osmond was the subject, and the substance used was adrenochrome. (See p. 87.) He experienced hallucinatory patterns of dots which resolved themselves into fish-like shapes, and reported: 'I felt I was at the bottom of the sea or in an aquarium among a shoal of brilliant fishes. At one moment I concluded I was a sea anemone in the pool.' (1954, p. 39.) Such delusory empathy appears to differ from normal empathy principally in terms of loss of the 'as if'. The 'one moment' during which Osmond wholly identified himself with the sea anemone is interesting because of its implied brevity. Loss of ability to distinguish between mere analogy and the literally meant also occurred intermittently, for similarly brief periods of time, with several of our mescaline subjects. Losses of insight into where or who one was, again of a transient kind, occasionally occurred among the more extreme reactions in our own series of experiments.

DELUSION

Delusion might be said to bear the same relation to normal belief as hallucination bears to normal perception. There is the possibility of an interesting interaction in which hallucination provides subject matter for delusion, while delusion provides a basis of interpretation for hallucinatory experiences. Such an interaction between delusion and hallucination is well illustrated by visual hallucination of the lilliputian kind: the 'little people' whom some psychotics see. It is not improbable that widespread superstitions about little people, for example the leprechauns of Ireland, had initially an hallucinatory origin. Some psychotics experience delusions of persecution by such 'little people' and we should keep in mind the fact that they may be able to call in their 'own eyes' (visual hallucination) as evidence for the real existence of their persecutors. This dependence of belief on what each of them 'perceives' by vision or hearing forms a common link between the psychotic and the normal individual. On this basis some measure of empathy with the psychotic and understanding of his problems of adjustment is possible.

Actual delusions sometimes occurred in our series of model psychosis experiments. More typically, however, the subject accepted hallucinatory and other happenings in ways which might better be described as 'half-belief' than as belief. For example, one subject, on looking out of the window, saw a row of rabbit hutches belonging to the Medical School as a crowd of charging Red Indians on horseback, with feather head-dresses streaming behind them. A little later they changed into prancing ponies. She nevertheless retained insight into the fact that despite what she 'saw' they remained rabbit hutches, and that the hallucinatory distortion was the result of having taken mescaline. The experiences in which actual loss of insight occurred tended to involve delusory ideas of a paranoid and persecutory kind. One subject, for instance, thought that she was being required to perform tasks of mathematical reasoning *because* the experimenters knew she was no good at mathematics and wanted to show her up. Another, while having the extent of his diminished field of vision tested, misperceived the test object used as a flame with which he thought the experimenter was going to burn him.

Some of the experimentally produced experiences—although

the subjects *did* retain insight into their mescaline-induced character—were of a type which would have provided promising subject matter for delusions. It may be stressed that an experimental psychosis subject has not only volunteered for the experiment and knows what has happened to him: he is also tested under laboratory conditions, and has memories of what it felt like to be normal yesterday and anticipation of what normality will feel like tomorrow. In all these respects the psychotic patient is different. He may or may not have insight into the fact that he is ill; he is in a mental hospital among other psychotics, not in a laboratory surrounded by interested and friendly experimenters; most important of all, yesterday was, and tomorrow will be, essentially the same as today. If he seeks explanations for his hallucinations, upsurges of dissociated emotions and other autonomous processes, the conditions for delusional interpretation are optimal.

One group of psychotic delusions comprises those of bodily change. The term 'body schema' was introduced in 1911 by Head and Holmes to denote awareness of one's own body as an object occupying space and composed of parts spatially related to each other. We have seen that changes in the body schema occur under certain conditions falling within the range of normal experience, notably in the hypnagogic state. Under mescaline, moreover, three of our subjects quite independently and spontaneously compared their body schema experiences to *Alice in Wonderland* happenings. It is therefore not surprising that psychotics, too, may develop delusions of bodily change. The toxic substance (perhaps adrenochrome) which is chemically like mescaline and which may be responsible for psychosis, may tend to increase the frequency of such experiences. Furthermore, it is possible that hypnagogic experiences may provide subject matter for psychotic delusions, as is suggested by the rather typical body schema disturbances experienced in the hypnagogic state by a badly deluded psychotic. This patient, who was intelligent and highly educated, not only described his experience to the writer, but *interpreted* it in the same objective way as an adjusted non-psychotic might have done, because it did not happen to fit into his delusional system.

Experiments with nitrous oxide and substances like mescaline may illuminate another possible mechanism of delusion. With large doses of nitrous oxide some subjects undergo continuous loss of consciousness. Others, however, experience intermittent losses

of consciousness and a resulting impression of discontinuities in the passage of time. Since events go on happening during the blank periods, unexplained and hence alarming changes in the environment may seem to take place. As a result of these brief periods of amnesia objects and people seem to appear, disappear and reappear in a way that provides excellent subject matter for delusory interpretations. These recurrent losses of contact with reality might be ranged along a scale from exaggerated states of abstraction or absent-mindedness at one end to losses of consciousness at the other.

An instance may be taken from one experiment (this time with mescaline) when the author was the subject, with the fairly large dose of 0.5 grammie. He was asked to play a game of chess with one of the experimenters. To the observers he appeared like an extremely absent-minded person who repeatedly had to be reminded when it was his turn to move. Subjectively the game was a curious one because of time-discontinuity experiences. The subject would look down to discover that one of his major pieces, having been taken by his opponent, was no longer on the board but was sitting beside it! This happened a number of times, the subject having no recollection of the moments of time in which the 'taking' had occurred. But he retained insight to the extent of being prepared to discount his own perception of the events as due to the fairly large dose of mescaline he knew he had taken.

Conditions for delusional interpretation were on this occasion, as in the other experiments, minimal. The subject was in familiar surroundings with a group of experimenters whom he knew well and accepted as friendly. He was playing with someone he had played chess with before and knew was not given to cheating. Contrast these experiences with those of a psychotic in a mental hospital, for whom conditions for delusional interpretations are optimal. It is not hard to see how effectively such a time-discontinuity mechanism might operate in giving birth to persecutory delusions or reinforcing them. On two occasions the writer and a psychiatrist or psychologist colleague have conducted interviews with mental patients whose persecutory delusions gave evidence of having developed in this way. One patient remained indignant about his home being invaded and himself removed to hospital, although he had 'done nothing'. The persecutory interpretation

placed on these events obviously could not be accepted.¹ The research workers and the patient found common ground, however, on the basis of assuming that the patient might in fact have done some grossly abnormal things (as he certainly had) before the medical invasion of his home, but had done them during periods of amnesia. It might perhaps be possible with certain patients to arrest the development of further delusions on this basis.

The second instance involved a patient who complained that whenever she saw a book, newspaper or other piece of paper with print on it, the page was always 'turned down' in a curious way that acted as a marker. The section marked always had a sinister reference to herself, and her enemies did this to her. If we reject the patient's own interpretation in terms of the malevolence of others, two alternatives remain. The first is that she was mistaken, or perhaps hallucinated, in seeing these folded-down pages. A second and perhaps better explanation would be in terms of the time-discontinuity phenomenon; that is, she had performed the turning down acts herself in books and periodicals that had, or seemed to have, reference to herself. Such acts we would assume to occur in these periods of transient amnesia; and the functioning of some such mechanism in certain forms of delusion—particularly persecutory delusion—might well repay further examination.

Thus we have seen that model psychoses induced by substances like mescaline, lysergic acid diethylamide and nitrous oxide assist the experimenters, and those who take part as subjects, to understand better the processes of abnormal mental life, and that this understanding may ultimately prove helpful for the treatment of psychotics.² The value of this understanding, moreover, does not end with its psychiatric use. As has already been argued, creative thinking, no less than abnormal thinking, depends largely

¹This patient's own reports of these events were reminiscent of those of the central character of Kafka's novel *The Trial*. The alarming experience of unexplained events to which this character, K, is subjected might well be explained in terms of a time-discontinuity mechanism of the type under discussion.

²The resemblance noted between mescaline intoxication and natural psychosis to which Osmond and Smythies refer (p. 85), receives support from Ardis (1956), who has described a series of psychiatric patients whose reported experiences more closely resemble those of the experimentally produced ('model') psychotic than classical reaction types.

on the autonomous presentation of past perceptions. Shakespeare saw this resemblance between 'the lunatic, the lover and the poet'—to whom we may add the scientist—and in the course of the following chapters we shall consider some relevances of abnormal thinking (resembling those experienced in model psychosis) to the autonomous aspects of creative thought. In certain cases, such as Nietzsche's, the A-thinking may even be simultaneously that of both psychotic and poet. But as reality-adjusted creativity depends essentially on the right relation between A-thinking and R-thinking, we shall first consider some of the general conditions conducive to original thought in both these aspects.

Note. Attention may be drawn to a further publication of the McGill University team (Heron, Doane and Scott, 1956). In further studies of prolonged sensory deprivation (cf. pp. 49-50) these investigators mention a number of effects which are also observable in model psychoses, and sometimes hypnagogically. These include vivid visual images and hallucinations; distortions of shape of real objects; movement of stationary objects; exaggerated brightness and luminosity of colours; and pronounced after sensations.

CHAPTER VIII

CONDITIONS OF CREATIVITY

To doubt everything or to believe everything are two equally convenient solutions; both dispense with the necessity of reflection.—**POINCARÉ**.

FOREMOST among conditions of creativity is a suitable and worthwhile field for its exercise; and it seems probable that destructive criticism of established ideas that are superstitious or otherwise false (although a socially useful activity) falls outside this field. Wholly destructive activity may therefore be dismissed as of only marginal interest to the understanding of creative thinking itself, especially as great iconoclasts have tended, on the whole, *not* to be creative thinkers. A fruitful advance of thought seems, rather, to result from reaction against established thought in the interest of its adjustment, refinement and extension; and the attitude that appears most readily to favour creative thinking combines receptivity towards what is valuable, in traditional and new ideas alike, with discriminating criticisms of both. A thinker on these lines is uninterested in established ideas when they are obviously wrong—this is the preserve of the destructive critic. He is concerned, rather, with vigorously criticizing ideas, both new and old, where they are most nearly right. To employ a mental model which may perhaps be appropriate, he is more concerned with 'growing points' than with 'dead wood'.

When the creative thinker tries to understand what his predecessors were attempting to achieve, he seems to be selectively receptive towards the more fruitful results of their efforts yet unwilling to regard the matter as closed, differing in these respects both from those who, concerned only to criticize previous thought destructively, have nothing to offer in its place, and from those who accept traditional thought in an uncritical, undiscriminating way. In this he proves his understanding of tradition, for it is possible to accept many things that one does not in the least understand. Many people, for instance, when being shown round a factory will have caught themselves or noticed others nodding or somehow signifying assent to something that they are told but do not

comprehend. No great intellectual effort is involved in the usual outward sign of agreement and 'understanding', whereas the person who *disagrees* must make it publicly evident whether he understands or not; thus the disagreement of a person who takes one's thought seriously enough to trouble to disagree with it is sometimes reacted to as a compliment. Moreover, the ability to offer relevant, intelligent criticism is quite often recognized for what it is, namely evidence of understanding; and criticism seems most productive of fresh ideas when confined to what is 'worth' arguing about.

Creative thought itself may in the course of time become an impediment to later thinkers. A great thinker may impose a tradition, an orthodoxy, which others who follow find hard to break. Those who support his ideas against his critics may, by this act of defending the *status quo*, be opposing the very activity he himself engaged in, namely extending human thought. For a long period of Western European history the authority of Aristotle (384-322 B.C.) was invoked against those who sought to liberate human thought from the enslavement of orthodoxy. In this period Aristotle's works were 'worshipped rather than studied'. At first sight, therefore, it seems strange that Aristotle has been regarded as a major pioneer of modern scientific knowledge. Yet Aristotle's own thought must be distinguished from the anti-scientific 'tradition of Aristotle', and it constituted a pioneer attempt to extend and classify human knowledge. It was Aristotle who provided many categories destined to become the nuclei of the major sciences and principal divisions of philosophy. His activity was, in an important respect, similar to the activity of the very men who sought to liberate human thought from 'the authority of Aristotle'. It was also markedly different from the activity of those who defended his authority. Where Aristotle was quite clearly wrong his thought is of little interest except to historians of philosophy and of science. Yet science itself grew out of vigorous arguments with his ideas on matters about which he was most nearly right. Examples of such growth are the substantial changes made in his astronomy; drastic revisions of his biology—such as excluding mythical animals from among the real zoological species which he described; and the development of logic itself, which is heavily indebted to Aristotle, even though its modern form is widely different from his.

It was those who quarrelled with Aristotelian thought who really added to the gigantic intellectual undertaking that he did much to originate. Aristotle himself cannot realistically be blamed for the period of human history so appropriately called the 'Dark Ages'. If 'blame' or causal responsibility is to be apportioned, then a substantial part of it must go to those who perpetuated the less fruitful aspects of his thought; who opposed new mental models because they conflicted with the traditional ones, or rejected new observations because the revered authority did not himself happen to make them and comment on them.

Receptivity towards what others have thought and believed on given issues seems to play an important part in creative thinking, but such receptivity does not necessarily exclude an important critical component. Great original thinkers such as Einstein were heavily indebted to their predecessors yet, as one psychologist points out, Einstein himself 'saw a solution to his problem by *questioning* the ordinary conception of time' (Hilgard 1953, p. 313, italics mine). Some innovators in the realm of art were led to make their contribution by being receptive not merely to knowledge of traditional thought provided by their secondary perceptions, but also to their own primary perception. Thus the Greeks progressed in their art beyond the Egyptians by portraying what they *saw* of the human form, rather than merely what they *knew* was there. Gombrich (1950) has drawn attention to the major advance achieved by this twofold receptivity to tradition and to perception. Unlike the Egyptians, the Greeks did not merely depict each part of the human figure from its characteristic angles, but also represented limbs obscuring others from view, distortion by foreshortening and other such effects.

Gombrich elsewhere (1954) deals with later aspects of this development when he contrasts Botticelli's anatomically incorrect figures in his famous 'The Birth of Venus' with later paintings by Raphael and Titian, and shows how these two later painters had mastered the task of representing the human figure. Titian is regarded as having accepted the challenge of his predecessor Raphael—and perhaps quite intentionally challenged his own successors—by portraying the human body from angles which were not only uncharacteristic but also extremely difficult to portray. Such development on the basis of earlier work, combined

with this kind of rivalry, constitute a creativity which seems to be distinguished by *serious receptivity towards previous thought products and unwillingness to accept them as final*. The later masters did not merely 'accept' Botticelli's pictures, nor did they waste time criticizing their obvious inadequacies as representations. Again, Titian did not regard the matter as closed when he saw Raphael's 'Triumph of Galatea'. Rather, he appreciated Raphael's skill, grappled with the same problem, and presented his own achievement, 'The Rape of Europa'. Gombrich is not concerned with appraising the relative artistic merits of these three masterpieces. His interest is in the effects of each of them as a thought product on its successor; as a good illustration, in fact, of discriminating receptivity—the process of trying to understand what one's predecessors were attempting to do and striving to do better, an activity which tends to play an important part in human creativity.

Those creative thinkers who have been concerned to analyse their own psychological processes have tended to stress their dependence on earlier work and input of information. The introspection of the physiologist Helmholtz about the conditions which favoured his own scientific insights provide an illustration: 'It was always necessary, first of all, that I should have turned my problem over on all sides to such an extent that I had all its angles and complexities "in my head" and could run through them freely without writing.' (Quoted Woodworth 1938, p. 818.) To this account Helmholtz adds: 'To bring the matter to that point is usually impossible without long preliminary labour.' The same emphasis on the accumulation of a large amount of relevant information occurs in the introspections of the mathematician Poincaré, who found that in his own case 'a period of preliminary conscious work . . . always precedes all fruitful unconscious work' (Poincaré 1908, p. 61). Poincaré was greatly interested in the problem of human originality and its determinants; he regarded such thinking as a process of recombination of ideas which he likens to 'hooked atoms'. During the period of 'unconscious work' these 'atoms' collide and it is such collisions that give rise to the new combinations. Poincaré is careful to add that the process is not one of mere chance, since the separate ideas have been selected according to some definite purpose and 'are those from which we may reasonably expect the desired solution'.

He stresses the importance of the preceding period of conscious work whose effect is to 'liberate the hooked atoms' and 'set them in motion'. In his own case he reports that sudden inspirations did not occur 'except after some days of voluntary efforts which appeared absolutely fruitless'. Yet such periods of conscious work (perceptual input) were less barren than they appeared and seemed to 'set the unconscious machine in motion'. Without them no insights would have occurred. Processes of a very similar kind are suggested by Picasso's presumably autobiographical statement about painting: 'The painter passes through states of fullness and emptying. That is the whole secret of art.' (In Ed. Ghiselin 1955, p. 59.)

A highly productive original thinker, Francis Galton, was also curious about the conditions of creativity. He chooses a different mental model, but many of his points of emphasis resemble Poincaré's. In describing human thinking Galton speaks of a 'presence chamber . . . where full consciousness holds court', and also 'an antechamber full of more or less allied ideas, which are situated just beyond the full ken of consciousness'. Effective original thinking is dependent upon 'large attendance in the antechamber', where there should be 'no ideas except such as are strictly germane to the topic under consideration'.¹ Galton's view is well illustrated in his treatment of mystical insights, which he regards as simply a special case of such a process with, once again, an input of relevant ideas, presence of similar ideas already in the antechamber, and interaction with those in the presence chamber. Galton writes: 'The devout man attunes his mind to holy ideas, he excludes alien thoughts. . . . This seems to me precisely analogous to the automatic presentation of ordinary ideas to writers and literary men.' (1883, p. 148.)

The substantial agreement of Helmholtz, Poincaré and Galton in their introspective accounts of creative thinking is the more interesting since each was himself a remarkably productive original thinker. All emphasize accumulation of relevant information

¹Galton possibly overstates this latter limitation. We should agree that relevant ideas must be present, but ideas relating to other contexts of an 'irrelevant' kind may well play an important part by providing the models for original insights. See Chapter V and also Chapter XI below. Thurstone (1952) similarly places emphasis upon 'incidental learning' as a determinant of creativity.

as a necessary component of such thinking. There may be a close relationship between such input and the attitudes of receptivity already discussed. Unfortunately for the occurrence of creative thought, higher education often seems to encourage an attitude—which may become habitual—of rejection rather than receptivity towards the creative thought of others. The psychologist Thurstone has provided an interesting examination of this problem on the basis of his experience as a university professor. He distinguishes between two opposing types of student, the one who is merely critical and the one possessed of creative talent. The first, when confronted with a new idea, will react to it in a distinctively negative way. By clear, logical thinking he may soon be able to show that the idea is wrong or that the plan is unworkable. The second type of student will react differently to the idea: 'He toys with it, and speculates what the implications might be if they could be demonstrated. Because of the novelty of the proposal his impulse is to wish it could be shown to be true.' (Thurstone 1952, p. 24.) Thurstone emphasizes that the two individuals exhibiting these opposing traits may be equally good in their 'intelligence'. They differ rather in some quality of receptivity, and there may even be a certain amount of 'gullibility' in the creatively talented individual. Thurstone's sympathies are obviously more with such gullibility than with the trait of 'intellectual docility' which, he considers, is often assessed as 'scholarship'. The attitude whose importance Thurstone stresses as a condition of creativity seems to involve a readiness to side with, to empathize with and explore the possibilities of fresh ideas. It also seems to be compatible with the attitude of discriminating criticism previously discussed. The attitude consists, in fact, of vigorous attention to ideas which, because they are important, merit criticism in the interests of their refinement or extension.

PERIOD OF 'INCUBATION'

Granted the attitudes and other conditions that permit sufficient input of relevant information, a period of ensuing inactivity or change of activity seems favourable to creative thought. Wallas calls this period one of 'incubation'.¹ We some-

¹Wallas (1926) distinguishes four stages of thought: preparation, incubation, illumination and verification.

times have fairly precise information about the length of such a period as, for example, in the case of Nietzsche's *Thus Spake Zarathustra*. In *Ecce Homo* Nietzsche describes how the ideas of the earlier book came to him on a specific occasion in the woods behind Lake Silvaplana in 1881, but writes that 'the period of gestation was eighteen months' before its sudden birth in February 1883. Amy Lowell, writing of the processes involved in the composition of her poetry, refers to one instance when she dropped her subject into the unconscious very much as one drops a letter into a mail box. Six months later the poem was 'there'. Robert Louis Stevenson thus described his own methods in imaginative work: 'Unconscious thought, there is the only method: macerate your subject, let it boil slow, then take the lid off and look in—and there your stuff is, good or bad.'

The relation between 'gestation' or 'incubation' and input of information is well summarized in the famous advice given by Lloyd Morgan: 'Saturate yourself through and through with your subject . . . and wait.' Much stress has been placed upon the importance of this incubation period by investigators of the psychology of creative thinking. Knowlson, for instance, regards passage of time as important because it permits the right associative connection to replace a wrong one that has been set up, and likens creative thinking in this respect to ordinary remembering. If we forget a word, active attempts to recall it may be singularly unsuccessful, but with the giving up of such efforts and a change of activity the forgotten item may emerge spontaneously. He suggests that this principle holds good for 'any process of transition from the unconscious to the conscious', and states it more formally as a law governing one of the primary conditions essential for the occurrence of inspirations and insights: 'A period of close inquiry and reflection should be followed either by a change of subject or a period of inactivity.' (Knowlson 1917, p. 87.)

Knowlson's law seems to be a special case of the more general principle known as Jost's Law, which states the general superiority of 'old' learning to 'new' learning in the association process. Jost's principles, together with some of their applications, are discussed more fully elsewhere. (McKellar 1952, pp. 133 ff.) One obvious way in which the passage of time can be assured is by a period of sleep. The relation between sleep and creative insights is not well understood, since sleep permits the occurrence

of not one but a number of things. Sleep ensures passage of time and may be beneficial to new insight for precisely this reason—the ageing of the associations according to Jost's Law. It also ensures that the thinker when he returns to his task will be a rested thinker, and perhaps for *this* reason better able to think creatively. Again, the sleeping and adjacent hypnagogic and hypnopompic states may provide concretizations in image form which sometimes assist the structuring of the problem. (See p. 122.) For some individuals, however, sleep seems to be accompanied by highly active thought processes. Such people undergo what might be called 'thinking in one's sleep', and several of our own subjects described themselves as actively thinking over problems while asleep. The activity appeared to be more like 'thinking out' of the waking kind than like ordinary dreaming, and tended to occur without visual imagery.

Although 'incubation' represents a favourable condition for creative insights, little is known of how it operates. It may well have beneficial effects for different reasons on different occasions, and with different individuals. We have noted in passing that sleep can involve periods of considerable mental activity as well as mere passage of time. Hence a study of a-typical forms of dreaming like this 'thinking in one's sleep' may help to throw light upon the nature of such incubation.

The processes through which incubation works probably play an important part in the production of autonomous 'Eureka experiences' or sudden insights whose importance is often stressed by creative thinkers. To take an illustration from the arts, Amy Lowell declares of her own poems: 'I know as little of how they are made as I do of anyone else's. . . . I meet them when they touch consciousness.' (In Ed. Ghiselin 1955, p. 109.) She adds that it is now her habit, no matter what she is doing at the time, to lay it aside on these occasions 'and attend to the arriving poem'. The products of what Galton calls the 'antechamber', granted the changes which incubation brings, may be impressive in their originality and difficult to relate to their perceptual origins. Yet, no less than with dreams and hypnagogic images, their origin is perceptual. As Lowes (1927) has shown by analysis of two of Coleridge's poems, 'good' as opposed to 'indifferent' poetry tends to be produced by a period of incubation and transformation into those autonomous mental events that we have called A-thinking.

The concept of A-thinking implies similarity not only between processes giving rise to normal human dreams and inspirations, but also between them and certain phenomena of psychotic mental life. There are obvious differences to be elsewhere discussed, but for the moment our concern is with similarities. Especially interesting are those cases where one man's A-thinking is simultaneously relevant both to creative thought *and* to psychosis. One of these occurs in the account which Nietzsche gave of the autonomous character of his thinking in one of the last books he wrote just before his psychosis became so florid that he had to be admitted to an institution. In *Ecce Homo* Nietzsche writes: 'One hears—one does not seek; one takes—one does not ask who gives: a thought flashes out like lightning inevitably without hesitation—I have never had any choice about it.'

It may be noted that science, as well as art and philosophy, has derived creative thought from A-thinking processes of such specific kinds as dreams and quasi-hallucinations. A well-known instance of this involved Professor Lamberton, a mathematician of the University of Pennsylvania, of whom it is reported that, 'having vainly wrestled with a geometrical problem, one morning on waking he saw the solution diagrammatically given on the wall in front of his eyes' (Still 1952, p. 192). The creative thoughts deriving from incubation may not often assume such dramatic forms. There are also a number of occasions on which important discoveries have operated hypnagogically or through dreams. Hilgard (1953) reports several such cases, the best known of which is perhaps that of Kekulé, Professor of Chemistry at Ghent, who evolved the concept of the benzene ring—not only one of the most important but also one of the most original ideas of modern organic chemistry—from a dreaming or hypnagogic state which provided the solution to his problem in pictorial form. Descartes appears to have encountered the basic notions of analytic geometry in a dream, but he did not report the accompanying circumstances in any detail.¹ Hilgard also refers to an archaeologist called Hilprecht who found the solution to the problem of a Babylonian inscription during a dream.

¹Descartes did, however, elsewhere report his hypnagogic imagery, which he distinguished from his dreams.

OVERLEARNING

A subject matter is said to be 'overlearned' rather than 'merely learned' when practice has been carried out beyond the point necessary for perfect performance or accurate recall. Overlearning bestows advantages because the resulting actions are more 'automatic', or the information more readily available for recall, than when mere learning has taken place.

It will be noted that, in the introspective account quoted above, Helmholtz emphasizes overlearning as a desirable condition of creativity. The same condition is also stressed in the advice given by Lloyd Morgan. Yet it is certainly not the case that all forms of overlearning have this desirable feature; in fact, some kinds of overlearning appear to favour mental rigidity rather than creativity. Their effects within the university teacher-learner situation are well described by the familiar joking definition of a lecture as 'that which passes from the notebook of the lecturer into the notebook of the student without passing through the mind of either!' The distinction drawn between primary and secondary perception (Chapter V) may prove helpful at this point. The kind of learning which has been too exclusively dependent on secondary perception may prove highly unsatisfactory if any sort of practical performance is required. This is well illustrated by the case of a highly intelligent professional philosopher who, when doing military service, found himself unable to learn how to work a machine gun. Eventually he declared his willingness to read up the various manuals and give a talk about the working of the machine gun but, he added, 'don't ask me to *do* anything with it'. This is the kind of happening which amuses 'practical' men. But practical men may be less willing to appreciate that the opposite process also occurs: that exclusive preoccupation with primary perception and concrete subject matter can produce a contempt for books and abstract classificatory techniques which does not favour creativity. At either extreme we may have an individual whose thinking is confined to what Koestler (1949) has called 'the arid plain of associative routine'.

It might be suggested that the conditions of overlearning favourable to creativity are those involving adequate interaction of the products of primary and secondary perception. As we have seen, the printed word and other media of mass communication

can extend an individual's perceptual experience in history, in geography, and into the realm of other men's imaginings. They provide form and content for original thought beyond those that can be learned from mere personal contact and primary perception. Yet it is obvious that these same ideas become more meaningful and richer in their associative linkages through first-hand personal experience, i.e. primary perception. This interaction of the products of primary and secondary perception may be illustrated from an issue of central importance to the future development of psychology as a branch of science, and to the specialized branch of medicine we call psychiatry. By reading textbooks one may acquire intellectual knowledge about neurosis and its treatment, and about psychosis and its phenomena such as hallucination and depersonalization. Yet the research psychologist gains an associatively richer understanding of these things by observing psychiatrists in action and having face-to-face contact with neurotic and psychotic patients. The next few years may see progress in that important branch of psychological science which deals with relations between the basic *principles* of psychology and what the psychiatrist and clinical psychologist actually *do*. It is, for example, probable that the psychologist's studies of the learning process will be highly relevant to the psychiatrist's work of therapy. Conversely, the study of hallucination may throw much light upon the psychology of normal perception, and *vice versa*.

The fruitfulness of such an interaction between any two groups of specialists depends upon the receptivity of each party to intellectual invasion. It is suggested that creative thought is more likely to result from these intrusions into the legitimate field of another specialist than from the process of each merely returning to his own subject matter with what he has 'learned' from the other. Narrow professionalism in either will, of course, greatly impede these invasions, which tend to be fruitful just because they are so highly disturbing to mere 'associative routine'. Their effect might be described as very often one of setting in motion the 'hooked atoms' of Poincaré, or of producing what Koestler views as 'two unrelated associative chains suddenly colliding with each other at a given point'. The product is quite often thought of an original kind. This importance of interaction between primary and secondary perception was well stated by Keats who declared that self-evident truths need to be 'proved upon our pulses: we read fine

things but never feel them to the full until we have gone the same steps as the author'.

Some principle is needed to enable the distinction to be made between the kinds of overlearning which favour creativity and those which merely make for mental rigidity. It has been suggested that the person able to present intelligent, relevant criticism of a set of ideas with which he is confronted provides public evidence that he *does* understand such ideas. Another criterion that may be applied as evidence of understanding is the ability to reformulate the ideas in question in some alternative way. This second criterion can also be used to enable us to distinguish the kinds of overlearning favourable to originality from those associated with mere rote remembering and mental rigidity. The extent to which a person 'really knows', in a way that will enable him to *use* his knowledge (whether in his thinking or in some action), seems to be related to this ability to reformulate it. Rigid adherence to a single set of concepts and inability to use alternative models appears to be unfavourable to creative original thinking, however much the subject matter has been overlearned.

SENSORY CUES

Conditions favourable to originality are not always concerned with such abstract conceptions as overlearning or the relation between secondary and primary perceptions. Some of the stimuli with which certain great thinkers sought to surround themselves are curious and even bizarre; yet their presence also seems to have been strangely necessary to creative thought. Knowlson (1917) has collected examples of cues which various thinkers seemed to prefer to have within perceptual range. Dr. Johnson needed to have a purring cat, orange peel and plenty of tea to drink. Balzac wrote all night stimulated by constant cups of very strong black coffee. Zola pulled down the blinds at midday because he found more stimulus for his thought in artificial light. Carlyle was for ever trying to construct a sound-proof room, while Proust achieved one. Schiller seems to have depended on the smell of decomposing apples which he habitually kept concealed in his desk! Kipling reports his own inability to write creatively with a lead pencil, and tells us that his strongly autonomous thought processes seemed to demand the blackest ink, all blue-blacks being 'an abomination' to

his creative tendencies (Ed. Ghiselin 1955). Spender (1946) gives more prosaic illustrations from the modern poets, such as Auden's addiction to tea and his own dependence on coffee and tobacco when composing verse. The conditions required to produce creative thought may have, on occasion, to be highly specific. Perhaps it is fortunate for subsequent human thought that Descartes spent his earlier life in an environment which permitted him to indulge his wish—or perhaps intellectual necessity—for working in bed. Only in later life did he come under the patronage of (or fall into the clutches of) the energetic and early-rising Queen Christina of Sweden. With Descartes we may contrast Buffon who seemed unable to think unless fully and properly dressed.

These conditions of creative thinking are curious in their variety and sometimes highly eccentric in their content. Yet their importance may have been considerable. Dealing more specifically with poetry, Spender argues that the basic problem of original writing of this kind is one of concentration. He contends that poets' supposed eccentricities are 'due to mechanical habits or rituals developed in order to concentrate'. Spender gives illustrations, some of which overlap with those collected by Knowlson and mentioned above. Concentration may well be of great importance, and the fact that original thinking and writing is extremely hard work, involving both concentration and endurance, should not be forgotten. We may take as illustration the philosopher Kant who organized his life into a system whose rigour and austerity approached that of a well-planned military campaign. At certain precise times of the day Kant worked in bed. There he may well have had some intellectual dependence upon the tactile stimulation provided by the blankets, which were arranged round him in a highly original way invented by himself. He appears to have been greatly disturbed when some trees grew up and hid the tower which he used as a mental focus when thinking out his *Critique of Pure Reason*. Had not the authorities (who respected Kant and the importance of his thought) cut down these trees, the meticulously exact combination of circumstances necessary to the creation of this very complex thought product might not have been present. The book is both one of the most difficult and one of the most important achievements of philosophical thinking; and Kant's rigid requirements about his surroundings were perhaps essential to the level of intellectual functioning and endurance that were needed to produce it.

To take another illustration, Freud chain-smoked while he worked out what was substantially a new branch of science, and during periods of national crisis his friends and associates were careful to ensure that he was adequately supplied with cheroots. This consideration on the part of other people (like that of the City Fathers of Kant's home town) may well have contributed something essential without which certain major advances of human thought might not have occurred.

Important aspects of that nebulous concept, 'mood for working', may depend on sensory cues. The understanding of this aspect of mental life contributed by the work of E. B. Holt (1931) has received too little attention by contemporary theorists. Holt has a great deal to say about stimuli of the 'mild annoyer' kind, which he suggests can play a very important part in determining mood and in reinforcing response: 'The rumble of a waterfall, the din and odour of factories and cities, and other "mild annoyers"', contribute unexpectedly yet demonstrably to the organic tone of persons who have long lived in their vicinity.' Holt is in close agreement with the psychoanalysts in his emphasis on the importance of early life. He argues that it is particularly when such stimuli have been encountered from early infancy that their presence may become 'almost indispensable to bodily well-being and normal behaviour'. He emphasizes the process of habituation by which such stimuli cease to annoy. The motion of the ship's deck which at first troubles the landsman becomes a prop to the sailor's well-being; it is something which he misses, perhaps a great deal, when ashore. The motion of a ship is a good example of sensory input, which, through habituation, may cease to be noticeable to consciousness; yet when it ceases its absence is noticed. The sensory cues which it provides are subliminal to consciousness or 'subconscious'.¹

It is interesting to note the possible relevances of Holt's theory to the psychoanalytic notion of emergence of new thoughts 'from the unconscious'. Such happenings interest Holt, but are given drastic reformulation by him and regarded as being evoked by subliminal sensory cues. With reference to the autonomous thought processes that play an acknowledged part in creative

¹The term 'sub-conscious' as used here should not be confused with the psychoanalysts' concept of the 'unconscious', which relates to an explanatory theory and is not a descriptive term.

thinking we would re-emphasize Holt's dictum: 'Any sensory impulse can pass through the central nervous system, and accelerate or retard motor processes, without entering consciousness.' (Holt 1931, p. 228. See also Chapter XII below.) Working in a familiar place involves subjecting oneself to a vast number of subliminal sensory cues which have become associatively linked with work activity. The act of working in a place one finds congenial for work provides for a sensory input of cues that have in the past provoked thought, sustained endurance, or perhaps been fruitful in evoking original ideas. The effect of such stimuli cannot be ignored, particularly in any explanation of *sustained* creative thinking.

MOTIVATIONAL FACTORS

Emotion, feeling, mood and temperament are obviously important components of creativity. This is a field that will only briefly be considered here, because its problems are varied and our relevant knowledge is slight. None the less, account must be taken of motivational factors of a social kind such as those requiring (if one wants to be creative) a realistic adjustment to what is permitted and encouraged by the society in which one lives. An illustration would be the motives that lead scientists today to qualify for and find employment in research institutions and universities. Equivalents in other ages were the patronage system under which such artists as Velasquez and Michelangelo worked, and the monastic establishments that gave men like Fra Angelico and Mendel an opportunity to produce their original work. Another category of motives is that of sentiments such as love, hate, and those associated with politics and religion. The Catholicism of G. K. Chesterton and the Quakerism of Whittier appear to have sustained their activity and determined much of the content of the resulting thought products. Sentiments like love (examples in lyric poetry are obvious) and hate (*The Dunciad* and Byron's *Vision of Judgment*) have performed similar functions.

Another group of human motives is biologically more fundamental. A measure of economic security, or at least some alternative device for insulating oneself from such basic human needs as hunger, seems to favour creativity. The value of financial security is demonstrated in the lives of Darwin, Galton and Byron. Closer inspection shows that those who lacked such security were

often able to make other adjustments that insulated them in some way from the pressure of want. It is not surprising, for instance, that Dostoevsky published more than half of all he wrote during the sixteen years of his marriage to Anna Grigorievna; for though she could not cure his gambling, she seems to have achieved marked success in her efforts to protect him from both interruption and want. 'I had', she wrote, 'to take upon myself the full weight of life . . . and I always tried to conceal from him all the cares and material concerns.' (Anna's diary, quoted Maurina, pp. 88-9.)

Rembrandt experienced acute poverty and on occasion recorded in paint some newly perceived pattern of light and darkness while his impatient creditors were literally at his door. But in the later period of his life he achieved an adjustment similar to Dostoevsky's. Hendrickje Stoffels, like Anna, seems to have been a woman with realistic qualities for which posterity has good reason to be grateful. She developed such skill in handling creditors that she was able to provide a great artist with this important insulation. The remoteness from distraction and basic want achieved by individual thinkers has varied widely; and our two illustrations suggest that insulation does not necessarily bear a simple relation to economic factors.

There has been much unprofitable speculation, particularly about artists, based on oversimplified theories of motivation. This has often been contributed by the less scholarly type of amateur for whose excesses the psychologist is often wrongly blamed. Bronowski, writing of Blake, effectively condemns such an approach: 'An able critic seems to have held that we understand Blake when we think that he was oversexed.' Bronowski remarks that it is an equally reasonable *guess* that Blake was undersexed. He goes on to point out that Blake was one of a population of nearly ten million English men and women, and that—again at a reasonable guess—more than half a million of these were either undersexed or oversexed. Bronowski comments: 'It seems a pity that no others of them found time to write *Songs of Innocence*. Or did they lack the gift? If so, how much of Blake's gift was that he was oddly sexed?' (Bronowski 1943, p. 131.) These comments display an appropriate reaction to a profitless tradition. Much unnecessary ill feeling between science and art would be avoided if people recognized that the responsible psychologist as

scientist is, like Bronowski, in close agreement with the student of literature in condemning this kind of pseudo-psychologizing.

Creative thinking is a natural phenomenon. There seem to be no adequate grounds for rejecting the possibility of eventually providing a causal explanation for it. To assert that we do not know the explanation of a given natural event may be a simple statement of fact. To say that we can *never know* is a dogmatic assertion going beyond the facts, rather than a moral or intellectual virtue, as it is too often assumed to be. Some of the conditions that appear to favour such creative thinking have been considered, and several of them seem definite enough to permit application.

In considering the ultimate causal explanation of such thinking it is necessary to refer to the traditional distinction between different categories of cause. The *sufficient* causation of any natural phenomenon is the complete combination of causal factors sufficient to account for its occurrence. It is obvious that present scientific knowledge falls short of what is required for any sufficient explanation of creative thinking. A *necessary* cause of any natural phenomenon is a cause in whose absence that phenomenon would not occur. Causes may be necessary without being sufficient. To illustrate, Thurstone would not deny that adequate intelligence is a necessary component of creativity; his argument is that intelligence is not a sufficient component, and that there are other necessary causes. Thurstone's view is strongly supported by Guilford (1950) who refers to the thousand cases of children with exceptionally high intelligence quotients whom Terman studied until (in 1950) they reached maturity. Guilford adds that while there is plenty of evidence of superior educational attainment, there was little sign among them of the creative genius of a Darwin or an Edison.

Again, although an adequate input of relevant information, and possibly also some period of incubation are almost certainly necessary conditions of creative thinking, they are not *sufficient* conditions of such thinking. The curious variety of sensory cues upon which different thinkers appeared to depend may have been *necessary* factors in their creative thinking. On the other hand, some of these cues may have been, for the thinker in question, merely *contributory* causes. In this case, while the thinker would have preferred the presence of such cues, they were not essential to his thought—that is, not causally necessary.

CHAPTER IX

WORKS OF ART AS THOUGHT PRODUCTS

Alike in art and science fruitful new combinations of ideas seem to form at levels below our consciousness, by a process not unlike our dreams.—F. L. LUCAS.

WORKS of art resemble dreams in certain important respects; for example, in the autonomous origin of much of their content. Having noted such resemblance we must also recognize important differences. Whereas dreams and images are solitary activities, art, like science, is essentially social. It has, moreover, 'a history, a style, in contrast to perception and dreaming which have not' (Gombrich 1954). Baudelaire wrote of 'the labour by which a reverie becomes a work of art'; this labour involves a highly complex relation between A-thinking and R-thinking.

Socially acceptable works of art usually require an 'author' (A-thinking) and an 'editor' (R-thinking) who may be the same person or two different persons, as in the case of a novel by Thomas Wolfe, the amazingly prolific writer who produced a million words, and the publisher who first restrained him from writing even more and then supervised the task of condensation. (Wolfe in Ed. Ghiselin 1955.) An 'editor' may demand more rather than less, as Dr. Johnson did from Goldsmith for *The Vicar of Wakefield*. Nor need his function be confined to revision and criticism; he may direct the author's activity into this or that channel, provide stimulus, or keep a gifted but unstable author 'on the tracks' and thus play a causal part in the effective production of a work of art. It has, after all, been said that Wordsworth's greatest achievement was the poetry of Coleridge.

It seems more usual, however, for the same individual to act as both author and editor of his own thought products, though he may also, of course, make use of external criticism from those whose judgment he trusts. His own subjective standards of criticism are themselves anticipatory reactions to the criticisms that

others are likely to make, and are built up from past perceptions of such criticisms.¹

Introspection reveals that such internal censorship may operate during ordinary speech and conversation. In an interesting passage Sullivan refers to the 'part' of himself which stands by and, as it were, 'listens' while he speaks. This 'part' he describes as an internal representation of the audience to whom he is communicating or intends to communicate. 'This private listener', he writes, 'has grown up as a complex function of information I have picked up over the years, of information I have undergone and more or less formulated in the activity of vivid exchange of ideas.' (Sullivan 1949, p. 189.) He describes this process as one of 'running correction' adjusted to a particular real audience. In the case of works of art and science the process may be described in our alternative terms as intellectual standards derived from past perception (both primary and secondary) of the criticisms likely to be made by this audience. A man may in the course of his thinking depend greatly—both for his casual and more considered communications—upon his own subjective critical standards, and their influence upon his eventual thought products may be very considerable.

Creative thinkers differ widely in the adequacy or otherwise of their subjective critical standards. They also differ in their ability to *enforce* these standards, which are liable to be overthrown by an upsurge of A-thinking components. Furthermore, the incidence of A-thinking components themselves may vary between two extremes. Some writers appear to be 'possessed' or 'dictated to' by their autonomous idea. Thus William Beckford had to work at his oriental novel *Vathek* for a long continuous period in order to keep pace with the fluency of his imagination; while *Kubla Khan* remains unfinished because Coleridge was interrupted when trying to get down on paper the long poem that had taken shape in his dream. Thomas Wolfe, as we have seen, was an extreme instance of A-thinking productivity. He reports of his first novel: 'I cannot say the book was written. It was something that took hold of me and possessed me. . . . Upon that flood everything was swept and borne along as by a great river. And I was borne along with it.' (*Op. cit.*, p. 187.) The A-thinking

¹Terence Rattigan makes use of an imaginary 'Aunt Edna' who represents an average theatre-goer and whose criticisms he anticipates while writing a play.

processes demanding outlet seem in this case to have been of an extraordinarily intense kind. Wolfe likens them to 'a huge black cloud' that was 'loaded with electricity . . . with a kind of hurricane violence that could not be held in check much longer'.

At the other extreme is an artist like the poet Gray whose A-thinking is deficient and therefore easily dominated by the censorship of reason. Emile Zola, for instance, found it necessary to write letters to himself about the characters in his novels in order to stimulate his imaginative processes. Schiller wrote to a young man unable to produce original ideas: 'The reason for your complaint seems to me to lie in the constraint imposed by your reason upon your imagination. . . . You critics are ashamed or frightened of the momentary and transient extravagances which are to be found in all truly great minds, and whose longer or shorter duration distinguishes the thinking artist from the dreamer. You complain of your unfruitfulness because you reject too soon and discriminate too severely.' (Quoted Freud 1900, p. 103.) Here Schiller seems to advocate a receptiveness towards the products of one's own thinking similar to that which Thurstone advocates towards the thought products of other people (see p. 118). Receptivity, whether of this 'introverted' or of an 'extra-verted' kind, appears to be an important condition of creativity.

It is perhaps not surprising that the eidetic imager Blake, who had ready access to fluent A-thinking, should have laid strong emphasis on the importance of such R-thinking processes as draughtsmanship and technique which he probably found much more difficult. Perhaps Voltaire represented the other extreme; and his saying that '*le critique est facile mais l'art c'est difficile*' may have been literally true of his own thinking. Similar emphasis upon the 'editorial' rather than the 'authorship' function is to be found in Brahms's advice on musical composition: 'Let it rest, let it rest, and keep going back to it and working over and over again until there is not a note too much or too little, not a bar you could improve upon.' (Graves 1951.) Beethoven thus corrected and recorrected his own thought products. Lucas (1951) has collected instances of these critical 'editorial' processes operating in extreme ways. Anatole France, for instance, required up to eight proofs of his books and Balzac as many as twenty-seven.

Selection, reasoning, craftsmanship and hard thinking all play an essential part in artistic thought products. So also does

learning. Before an artist can produce an acceptable work of art he must learn a great deal from others. In painting the student or apprentice has to learn—or rather overlearn—a number of technical processes to which he will transfer the effects of still earlier learning.¹ Thus a young artist learning to prepare and mix his colours may be helped by early contacts with childhood paint-boxes; or—since the transfer effects of learning can be negative as well as positive—these recollections may prove to be a hindrance rather than a help. Every adult learner is heir to a long process of early learning, and may have had to go through the unpleasant process of 'unlearning'. Learning and the ability to transfer what has been learned from one problem to another provides a short cut for an artist, who is unwise to scorn instruction and rely on his untutored talent, his innate 'intelligence'.

Intelligence is not a 'thing' but a useful word to describe certain aspects of the behaviour of living organisms,² and to denote one of the factors that may make a certain task difficult to a given individual. But behaviour in problem solving also depends on other factors such as familiarity with similar tasks in the past and reliance on 'insight' rather than random activity or 'trial and error' methods. In artistic creation the R-thinking processes of learning and problem solving are too little understood, and it is unfortunate that research in this field has lagged behind the application of intelligence tests to the organization of human living.

We have seen that Poincaré in his introspective analysis of his own mathematical thinking emphasizes not only the period of *unconscious* work, but also the preceding period of *conscious* work. This analysis seems to apply also to the production of works of art. Flaubert, for instance, steeped himself in old-fashioned magazines and cheap novelettes so that, when the time came to write, he knew exactly what *Madame Bovary* would be reading, thinking and day-dreaming. In the same way, painters often make hundreds of drawings and sketches in preparation for a single picture. In all these respects art resembles mathematics rather than the dream.

¹Hebb (1949) writing of adult behaviour has pointed out that often 'what seems to be learning is really half transfer'.

²As Eysenck has pointed out, 'intelligence', like 'height', is a construct: 'it is a concept which we find useful in describing human conduct' (1953, p. 21).

And now, having discussed the author-editor relationship between A-thinking and R-thinking and touched on a few specific aspects of R-thinking in art, we shall consider the difficult but fascinating problems that arise out of the numerous 'other' components in the making of a work of art.

A-THINKING IN WORKS OF ART

Rather than generalize about how the creative process *must* work, it seems better at this stage of our knowledge to consider some of the ways in which it is known to have worked with individual artists: to ask ourselves what types of A-thinking may have provided them with raw material. *Dreams* are one obviously fruitful source of such material. The blind and deaf authoress Miss Helen Keller reports: 'I believe that much that I have written (is) . . . directly due to these dream experiences and my ponderings over how they came.' The artist Fuseli is reported to have eaten pork for dinner in order to produce dream material for his somewhat nightmarish pictures.¹

Hypnagogic imagery also appears to have been used by artists as source material. We have already seen that the overture to the *Rheingold* came to Wagner as an auditory hypnagogic image, and that Edgar Allan Poe also seems to have made use of his hypnagogic experiences. The surrealist Max Ernst reports that after having a hypnagogic vision which decided him to 'explore' such symbolism, he succeeded in 'being present as a spectator. . . . I had only to reproduce obediently what made itself visible within me' (Ed. Ghiselin 1955, p. 67). Lewis Carroll found that many ideas for stories came to him in the night. He found these so fruitful as a source of subject matter that he invented an instrument which he called a 'nyctograph' to enable him to write them down (Reed 1932). A close parallel to the case of Lewis Carroll is to be found in one contemporary author. The writer and some of his research colleagues formed the opinion that the highly imaginative stories of Mr. Ray Bradbury, such as *Dark Carnival*, derived partly from hypnagogic experiences. Mr. Bradbury has

¹An interesting example of A-thinking processes occurring during the 'waking nightmare' of a fever is Michael Burn's poem *The Flying Castle* (1954) written in a hospital ward with a high temperature while Burn was a prisoner in the Castle of Colditz.

confirmed that the hypnagogic state is *one* of the sources from which he has drawn his imaginative ideas: 'Quite often I do discover some preciously good material in the half-wakened, half-slumbery time before real sleep. Quite often I have forced myself completely awake to make notes on ideas thus come upon.' (Personal communication, 1954.)

Hallucination has probably played a considerable part in certain thought products of the artistic kind. A well known instance of this is Blake, whose eidetic imagery and tendency to visual hallucination have already been considered. 'He actually *saw* these things', said William Rothenstein when he was showing some of Blake's paintings to Rodin (Lucas 1951). Blake's earliest biographer has described the artist's unusual faculties: 'He always asserted that he had the power of bringing his imagination before his mind's eye so completely organized, and so perfectly formed . . . that while he copied the "vision" (as he called it) upon his plate or canvas, he could not err.' (Frederick Tatham in Russell 1906, p. 18.) As for subjective experiences of the ordinary imagery kind, these naturally play so large a part in poetry as well as painting that no examples need be given; though we may note in passing that poets, like other men, differ from one another in their image life.

Sometimes fictional characters are made by their creators to undergo experiences of these kinds. Fictional dreams are very common. In Emily Brontë's *Wuthering Heights* the narrator has a hypnagogic vision of the name 'Catherine'; he tells how his eyes closed, but that 'they had not relaxed five minutes when a glare of white letters started from the dark as vivid as spectres. The air swarmed with "Catherines".' An instance of a hypnopompic experience occurs in Robert Graves's novel *Claudius the God and his Wife Messalina*. The Emperor is made to experience a vision when waking in the morning, and it is interpreted supernaturally—as it certainly would have been in such an age. It is perhaps of interest to note in passing that both these experiences are reported in the first person, by Emily Brontë's narrator and by Claudius himself in his supposed autobiography.

Certain artists have been quite explicit about the fact that they have drawn their source material from *introspective observation* rather than external perception. Paul Klee explained that he had been concerned no less than other painters to help human

understanding of natural phenomena. But, he added: 'The artist is human; himself nature; part of nature within natural space.' (Klee 1925.) Hence, though Klee was not concerned to produce photographic replicas of external objects, his work was in a sense 'representational'. It was representational of the products of subjective imagination, and Klee insisted on 'the right of the painter to excite the imagination and to consider dreams, as well as still life, material for their art' (Miller 1945). A comparison might well be made between Klee's paintings and the psychologist Titchener's work; for both have produced, the one in paint, the other in words, quite remarkable achievements of skilled introspection. It is also interesting to observe, in view of Klee's intense preoccupation with music, the apparently synaesthetic quality of some of his work.

There appears to be much in common between Klee's art and such phenomena as dreams, nightmares, imagination images, hypnagogic experiences, hallucinations, luminous dust and the like. But not all his work portrays such visualizations. Evidence suggests that other of his thought products arose in different ways resembling automatic writing or doodles on telephone directories rather than attempts to portray actual visualizations.

Another sort of A-thinking that may suggest—even dictate—a work of art is *cinematographic eidetic imagery*. In one chapter of *Across the Plains* Robert Louis Stevenson describes an author whose creative thinking was fluent and autonomous. He experienced dreams in which 'little people' made up his stories for him, and all he had to do when this autonomous activity was completed was to write it all down and 'pay the registration' for the letter containing the manuscript. This account has sometimes been interpreted as autobiographical. It has been possible to obtain a fuller account of creative thought processes of an apparently similar kind through the courtesy of a contemporary authoress.

Miss Enid Blyton's stories for children cover several different age ranges and in all she has written several hundred books. The cinematographic imagery processes responsible are of considerable interest. They are described, not as typical of literary creativeness, but as representing one interesting form in which it *can* occur. Miss Blyton reports: 'I shut my eyes for a few minutes, with my portable typewriter on my knee; I make my mind a blank and wait—and then, as clearly as I would see real children, my

characters stand before me in my mind's eye. . . . The story is enacted almost as if I had a private cinema screen there.¹

The strongly autonomous character of the imagery is apparent from Miss Blyton's further description of her psychological processes: 'I don't know what anyone is going to say or do. I don't know what is going to happen. I am in the happy position of being able to write a story and read it for the first time, at one and the same moment.' The authoress uses the term 'under-mind' to denote the source of her autonomous imagery, and interprets the phenomena of her literary creativeness as a perfectly natural, though somewhat unusual, psychological process. The activities of the 'under-mind' are at times amusing. 'Sometimes', she writes, 'a character makes a joke, a really funny one that makes me laugh as I type it on my paper, and I think: "Well, I couldn't have thought of that myself in a hundred years!" And then I think: "Well, who *did* think of it?".'

An interesting feature of this autonomous imagery is its resistance to interference. Sometimes Miss Blyton has been troubled when, as she says, 'something crops up in the story which I am sure is wrong, or somehow out of place. Not a bit of it! It rights itself, falls into place—and now I dare not alter a thing I think is wrong.' Another interesting feature is that the 'under-mind' is receptive to directives from the 'editorial' functions of consciousness as to the appropriate length of the stories. No matter what length Miss Blyton is writing to, the story completes itself, and she reports, 'ends, almost to the word—the right length'.

Miss Blyton writes that this interesting imagery began in childhood, in what she called 'night stories'. She mentions her surprise when she learned that other children were not subject to similar 'night stories'. In response to questions she clearly distinguished what we might call the 'cinematographic eidetic imagery' responsible for her literary work from both dreams and hypnagogic imagery. While her imaginative characters may find their way into her dreams the imagery itself is of a different kind, and she distinguishes it also from a number of descriptions

¹The author is very greatly indebted to Miss Enid Blyton for a series of letters ranging in time from February 1952 to November 1955 in which, with the utmost kindness and patience, she has answered questions as to her methods of creative work; and also for very generously giving permission for the publication of extracts from these letters in the following pages.

of hypnagogic experiences sent to her by the writer. She adds: 'The simile of a "private cinema screen" is the best I can think of. But it's a three-dimensional screen, complete with sound, smell and taste. This is why I can describe things so realistically in my stories "as if I had been there". I have been there—but only in my imagination.' Miss Blyton is not subject to other kinds of atypical imagery such as number forms or colour associations.

One might expect that a person subject to such impressive autonomous imagery would interpret the occurrence in some a-scientific way. It is therefore the more interesting to find that this type of explanation is rejected by the authoress herself, who is sympathetic to our associationist theory that the content of her imagery is composed of rearrangements of past experiences. She reports recognizing 'many things thrown up from my under-mind, transmuted and changed—a castle seen long ago—a dog—a small child—words long forgotten in a new setting'. Elsewhere she writes: 'There are, for instance, many islands in my stories, many old castles, many caves—all things that have attracted me in my travels. These things come up time and again in my stories, changed, sometimes almost unrecognizable—and then I see a detail that makes me say: "Yes, that's one of the Cheddar Caves surely"! Such occasions of recognition are interesting and suggestive for the theory that we can apparently recollect, and thus seem to 'imagine', many past percepts which we are *not* in this way able to recognize. In the same letter Miss Blyton expressed her more general view of her imaginative processes: 'I think my imagination contains all the things I have ever seen or heard, things my conscious mind has long forgotten.' This view is consistent with our own thesis as to the perceptual origins of both the content and form of imaginative thought products.

It is significant that Miss Blyton experiences this strongly autonomous visual imagery only when she is writing imaginative stories. It did not occur, for instance, when she was writing her autobiography. This, she reports, 'was written in exactly the same way as most writers write—by thinking and planning . . .' In a later letter Miss Blyton expanded this remark: 'If I have to write an article—something serious, abstract or considered—then I am as slow as anyone else doing the same thing. I think hard—deliberate—write a sentence or two—erase one—rewrite—think again, and so on.'

Aware of this difference between her considered and imaginative writing, Miss Blyton sat down to write her first play without anticipating any difficulty. This is what happened:

To my dismay and bewilderment, I could not get going at all. I began, read what I had written, knew it to be all wrong, and tore it up. This went on for two and a half days. . . . Then I suddenly knew what was wrong. I was using the same procedure for a play as for a book—and this was utterly wrong. [After this realization] in half a second my mind cleared, and I saw a big stage, in all its details. I saw Toyland there as represented by *scenery*. I saw exits and entrances through which the characters could come. And of course they came.

It took a little time for Miss Blyton's 'private cinema screen' to become adjusted to the new medium; but when it did, auditory imagery was prominent, especially in songs (about twenty-five lyrics). Of one of these she writes: 'It was not a song I would have thought of myself, if I had *tried* to write it, and seemed to burst out spontaneously from the characters then on the stage (about 25 or so) so that I saw them dancing to it, and heard them singing it.'

The work of Miss Blyton is an interesting instance (of a somewhat a-typical kind) of a process wherein the 'author' (as opposed to the 'editor') functions of creativity operated in a strongly visual way. As has been already suggested, this process of visual imagining, like other forms of thinking (however creative and original), owes its content to *prior* perceptions, often dating from long ago. Other kinds of artistic creation may depend more directly upon *contemporary* or *quite recent* experience and attempts to reproduce what has just been perceived; and it is these that we shall now consider.

EVERYDAY EXPERIENCE AND IMAGINATION

Preoccupation with subjective phenomena as sources for works of art may lead us to underestimate—even to overlook—the more ordinary, objective perceptions of a poet or painter. For instance, the immediate perceptions on which Keats drew for his descriptions in *The Eve of St. Agnes* were unknown until it occurred to Mr. Robert Gittings to investigate a visit paid by Keats on 25 January 1820 to Stansted, near Chichester. The

results of these researches (Gittings 1954) are convincing, illuminating, and apposite to our present study.

It has often been noted that many of the trappings of this poem are anachronisms; that a mediaeval room would have no fringed carpets and a mediaeval bed no linen sheets. But at Stansted House there were just such carpets. There were also tapestries, including a famous one from Arras. And as Keats went round the house he saw curtains, bed-hangings and luxurious stuffs and furnishings of every sort. The occasion of opening the house that day to the public was the dedication of a neo-Gothic chapel; and after Keats and his friend Brown had seen the house they attended the lengthy ceremony of dedication. Keats had no interest in the service. From his seat, however, he was gazing all the time at a three-arched window filled with diamond panes and incorporating armorial bearings in stained glass.

From Stansted Keats returned to Chichester and set to work on the completion of his poem. *The Eve of St. Agnes* had started in a severely mediaeval atmosphere, based on Keats's observation of old buildings in Chichester. But now, after seeing Stansted, he had newer observations to record. It was because of these recent vivid percepts that Keats furnished Madeline's room with gold-fringed carpets, gold and crimson cloths, and other things that he could have seen in Stansted House. Nor had he wasted the two or three hours spent in the chapel, gazing at the neo-Gothic window:

A casement high and triple-arch'd there was
 All garlanded with carven imageries
 Of fruits, and flowers, and bunches of knot-grass,
 And diamonded with panes of quaint device,
 Innumerable of stains and splendid dyes,
 As are the tiger-moth's deep-damask'd wings;
 And in the midst, 'mong thousand heraldries,
 And twilight saints, and dim emblazonings,
 A shielded scutcheon blush'd with blood of queens and kings.

As Gittings comments: 'The wonder is not that Keats's unconscious eye should be so influenced, but that his conscious art should work so magnificently upon the picture that his experience presented to him.' (1954, p. 81.)

The temptation thus to ignore an artist's everyday doings and incidental perceptions, and the part which these may play

in his thought products, is all the more insidious when the artist in question is known to have drawn heavily on subjective sources. For instance, the marked differences between the stolid Victorian don, the Rev. C. L. Dodgson, and the imaginative Lewis Carroll have been the subject of much interesting comment. Yet Lewis Carroll drew heavily upon Mr. Dodgson's daily life, and depended more than is sometimes appreciated on his emotional preoccupations. For example, Taylor (1952) contends that the High and Low Church parties, whose disputes greatly interested Dodgson, appeared in the guise of Tweedledum and Tweedledee who fought over a rattle (for which read 'ritual'); and again in the Walrus and the Carpenter. It is equally evident that Lewis Carroll made substantial use of Dodgson's mathematical knowledge. Thus Taylor points out in his scholarly and insightful book that Alice's protest, 'I shall never get to twenty at that rate', incorporates a mathematical problem based on scales of notation. Again the White Rabbit, watch, gloves and fan were all conjuror's properties, and as such would have readily occurred to Dodgson who was a keen amateur conjuror.

Other details can be traced in the Mad Tea Party, which did not find its way into the story till a later version. For instance, when the Dormouse asks, 'What day of the month is it?' Alice replies, 'the fourth'. We know that the month is May and that the March Hare is therefore not so mad as he might have been in March. This being so, the choice of 4 May is not likely to have been accidental, since this was Alice Liddell's birthday! Again, the croquet scene is not difficult to explain in view of Alice Liddell's own report: 'About the time when *Alice* was told, we used to spend a good many happy hours in the Deanery garden trying to play croquet. Chess came later.' (Quoted Taylor 1952, p. 72.) A hint of *Alice Through the Looking Glass* and its central theme is found in this last sentence.

Taylor's study of the two Alice books is not unlike Livingstone Lowes's investigation of Coleridge's two poems. Although the analysis is briefer, it is detailed enough to indicate why certain items of content and certain themes of the stories are so and not otherwise. Taylor was concerned not only with what Freud, in the case of dreams, called the 'manifest content', but also with something approximating to Freud's 'latent content'; though this is derived principally from symbolism which Dodgson wrote quite

intentionally into the stories. Taylor also noted that Dodgson was not the first mathematician to resort to imaginative activity, often with a mathematical subject matter. In this Fechner had preceded him, and some of Fechner's previous imagining quite probably influenced the content of *Alice Through the Looking Glass*.

AMBIGUITY IN ART

The thought products we call works of art are not always clear and unambiguous communications. Ambiguity that permits a variety of interpretations and further imaginative activity on the part of the beholder may contribute to their appeal. A person confronted with ambiguously structured sense data has an opportunity to 'shape' his perception according to the needs of his personality. Thus ambiguous perceptual cues incorporated in a work of art may appeal to a variety of different kinds of people and perhaps also contribute to the persistence of the artist's reputation through successive ages. This may or may not be true in general; but certain of the works of great artists bear witness to at least an implicit awareness by them of this *principle of ambiguity*.

Gombrich puts considerable emphasis on this process of 'shifting something of the load of creation to the beholder'. He suggests that the principle involved is related to a more general law of perception, namely the Law of Pragnanz as formulated by the Gestalt psychologists. This law states the tendency for visual and other perceptions to be displaced away from the complex, the unstructured and the a-symmetrical, and towards the simple, stable and symmetrical. In the act of perception itself and also in the subsequent process of remembering—according to the Law of Pragnanz—omissions are rectified and amorphous, ambiguous perceptual cues are given more definite structure, reflecting the personality needs of the beholder.

Elsewhere Gombrich takes Leonardo da Vinci's *Mona Lisa* as an illustration of this process. We can be impressed by the changing expressions on La Gioconda's face without noticing how Leonardo achieved his effect—by leaving indistinct (no doubt deliberately) the eyes and the corner of the mouth. Gombrich writes: 'Leonardo achieved his greatest triumphs of life-like expression by blurring precisely the features in which expression resides, *thus compelling us to complete the act of creation.*' (Gombrich 1951, p. 222, italics mine.) He also suggests that this

principle has been used by other, later artists: 'Rembrandt could dare to leave the eyes of his most moving portraits in the shade because we are thus stimulated to supplement them.'

In literature, too, this principle has sometimes been applied, sometimes ignored. The first draft of Coleridge's *Christabel* described in some detail just what were the terrifying attributes of the witch Geraldine, who is so suddenly unmasked in front of Christabel. He changed this, and in the final version left these qualities undefined:

A sight to dream of, not to tell!
Oh shield her! Shield sweet Christabel!

The words eventually chosen are designed to stimulate the reader into completing the act of creation for himself, and he is left to 'dream of' (imagine) what the poet does not choose to tell. Coleridge's use of this principle may be contrasted with the deficiencies of superficially similar works. Thus the horrors of Anne Radcliffe's *Mysteries of Udolpho* (1794) suffer from dependence upon the details of a complex apparatus which robs them of their mystery. Horace Walpole's *Castle of Otranto* (1764) again, goes into details, such as the statue which drips blood, that may rather amuse than terrify the modern reader. These explicit details fail to impress as does Coleridge's evocative treatment of the supernatural.

As Maslow (1948) has pointed out, the naming of an experience may screen it off from our further emotional response. It may certainly limit emotional response to works of art, as is apparently well understood by those painters and writers who *hint* rather than unambiguously structure their thought products. Thus when his illustrator for *The Hunting of the Snark* drew a picture of the snark, Lewis Carroll did not allow this picture to appear, much as he admired it. Having made the snark 'strictly unimaginable' he wished it to remain so. Yet Carroll himself in later years made the very mistake he had sought to avoid, by providing a definition of a snark as 'a portmanteau creature, partly a snake and partly a shark' (Reed 1932, pp. 52-3). This kind of naming, far from enhancing our appreciation of the poem, tends to destroy it.

A poet or writer sometimes uses words in ways that differ markedly from those of the grammarian and logician. Words may be chosen for their stimulus quality, the fluent associations they

evoke rather than precision in the meaning they convey. Experiments have been conducted to ascertain which types of word induce the greatest fluency of association. It has emerged that nouns yield reliably more associations than adjectives; that stimulus words chosen to represent happy experiences yield more than those chosen to represent sad ones. Again it has been found, for both English and French, that concrete nouns provoke associative responses more readily than abstract nouns or adjectives. A poet's purpose in choosing his words is nicely illustrated by Crawshay-Williams's discussion (1947) of Keats's statement, 'Beauty is truth, truth beauty'. Keats put this idea in an illuminating but inaccurate way well suited to his purpose of stimulating the imaginative activity of his reader. With this five-word statement Crawshay-Williams contrasts the 7,000 words used by Ogden and Richards about truth in *The Meaning of Meaning*. These fail to stimulate the imagination as Keats's five words do, but are adapted to *their* purpose of promoting accurate analytic thinking.

The imaginative value of the stimulus quality of words is well illustrated by Thouless (1930) with reference to the poem by Keats previously discussed. In *The Eve of St. Agnes* Keats wrote:

Full on this casement shone the wintry moon,
And threw warm gules on Madeline's fair breast.

The words are carefully chosen to promote the desired emotional and romantic associative processes in the reader. Thouless contributes an attempt to make the same statements without such words, replacing all the emotionally coloured words by neutral ones. The lines now become:

Full on this window shone the wintry moon,
Making red marks on Jane's uncoloured chest.

As Thouless remarks, although the lines have essentially the same objective meaning, 'all its poetic value has been knocked out of the passage by these changes' (1930, pp. 16-17). The words are no longer effective as stimuli to appropriate kinds of associative processes.

REPRESENTATION AND ARTISTIC EFFECT

The various techniques that an artist must use to produce certain effects may not always appeal to those who think art should

be representational. It is not our task to enter into such controversies, though we may perhaps note in passing that those who dislike a work of art quite often completely misunderstand the artist's purpose. But issues relating to the psychology of perception arise in connection with this question of 'representational' art, since those who like it sometimes have to choose between what *is* representationally correct and what *appears* to be correct perceptually. The standard example is the pillars of Greek temples, which the ancient architects had to taper at the top to make them 'look right'. Psychologists know very well that there can be considerable discrepancy between what is objectively, and what is perceptually, correct. Koffka (1931) incorporates this awareness in the distinction he makes between the 'behavioural' (perceived) and 'geographical' (actual) qualities of the environment. Painters and architects may also be concerned with this fact: that for sense data to be perceived as correct they must under certain conditions be constructed geographically *incorrect*.

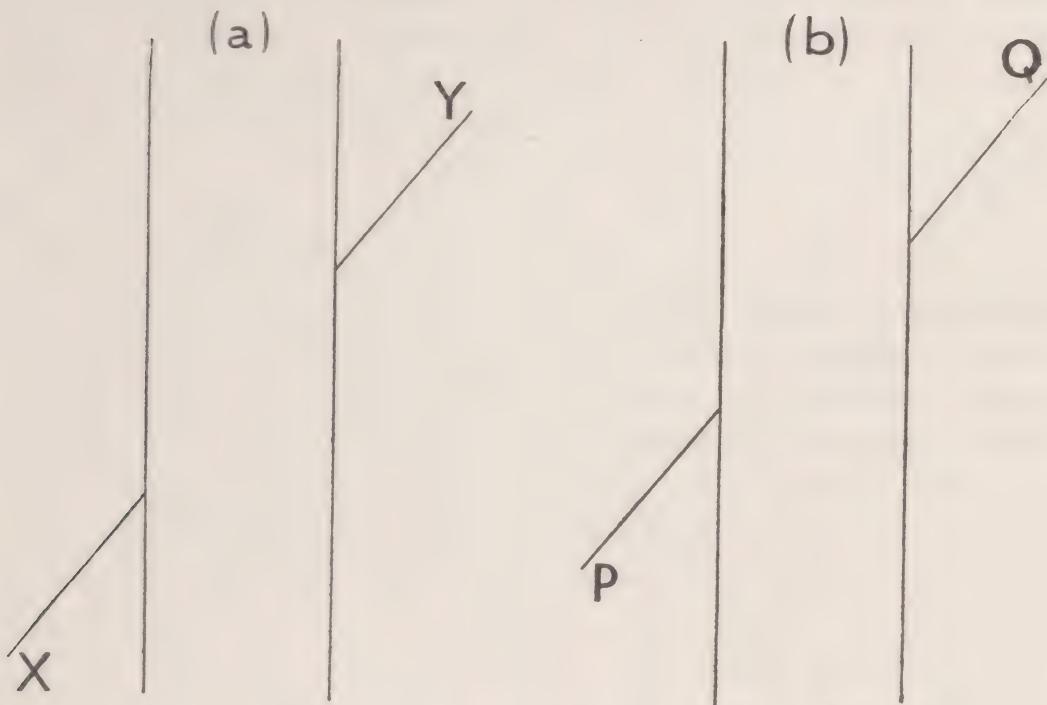


FIG. 8.—Poggendorf's illusion.

Let us take a simple illustration of our own. The accompanying diagrams are modifications of Poggendorf's illusion. In diagram (a) the line X—Y is in fact continuous. Geographically it is continuous,

but perceptually it is not. Discrepancy between the geographical and the behavioural qualities may be said to characterize this illusion, like illusions in general. From the first figure we may construct diagram (b), which represents the kind of thing the Greeks achieved in their architecture. A correction has been introduced to compensate for the illusion. The line P—Q may look (at least approximately) correct. But to appear perceptually correct it is, and must be, geographically incorrect. The line P—Q is not continuous thought it appears to be, while the line X—Y is continuous, though it appears not to be!

The need for geographical adjustments in art may take a variety of other forms. For example, colours may for perceptual reasons be manipulated in a way not geographically representational. Thus brightness can be introduced into a painting by the addition not of white but of black. Such contrast is a special case of a wider phenomenon affecting complementary colours, which makes yellow look most yellow when adjacent to blue. On matters such as these there are many interesting possibilities of fruitful interaction between creative artists and scientific investigators. The artistic and scientific attitudes may even, on occasion, co-exist prominently in the same individual, as is shown in Leonardo's curiosity about problems of visual optics, and the accuracy of Michelangelo's knowledge of anatomy.

Works of art, whether poems, paintings, music, novels or sculpture, are man-made arrangements of matter and of symbols representing matter. Like other natural phenomena they can be causally explained; and psychological analysis may, by investigating causes, contribute to a better understanding of works of art. We may take as an illustration the two poems by Coleridge that we have from time to time considered. Most people remain largely uninterested in how *The Ancient Mariner* and *Kubla Khan* came to be written or why they assumed the forms they did. Others are interested, but allow their curiosity to rest on learning that Coleridge wrote *Kubla Khan* from a dream he had after reading a passage in *Purchas's Pilgrimage*. A few remain curious until less obvious causal determinants of the poem have been found and analysed. Lowes, in his outstandingly thorough study of Coleridge's imagination, displays a more extreme example of human curiosity; for his curiosity remained unsatisfied until he had himself worked through virtually all the books that Coleridge was known to have

read before he wrote the poems. He sought to understand Coleridge's creative imagining by studying the raw material available to him for such imagining.

Of these graded attitudes the last is the most clearly scientific. Any adequate scientific analysis will pay attention to the subsidiary and least obvious causal processes, as well as to the superficial, obvious ones; and there is a close parallel between Lowes's investigation and the psychoanalyst's activity in patiently studying the associative processes of a dream and relating them to their original perceptual origins. By implication Lowes confirms this likeness between the literary investigator and the psychoanalyst when he writes of other great imaginative works. Of Dante's epic he says: 'Well nigh all the encyclopaedic erudition of the Middle Ages was forged and welded, in the white heat of an indomitable will, into the steel-knit structure of *The Divine Comedy*.'¹ This quotation (which incidentally summarizes the associationist view of original thinking defended in this book) asserts the importance both of the motivational processes and of the diversity of perceptual origins from which it can select.

Again, Lowes writes of Chaucer: 'I have trailed him, as I have trailed Coleridge, into almost every section of eight floors of a great library.'² Long as *The Divine Comedy* and *The Canterbury Tales* are, each is a very considerable condensation of its available perceptual origins; and in this respect both poems resemble dreams. Freud has observed that a dream when written down may occupy only half a page, whereas its analysis may take from six to twelve times that space. He adds: 'Dreams are brief, meagre and laconic in comparison with the range and wealth of the dream thoughts.' (1900, p. 279.) No one would call *The Divine Comedy* or *The Canterbury Tales* 'brief, meagre and laconic'; yet Freud's comment is relevant to them—on a different scale. It indicates the proportion that prevails between a poem, however long and great, and the experiences (primarily and secondarily perceived) that constitute the knowledge needed for writing such a poem.

¹Lowes 1927, pp. 426-7.

²loc. cit.

CHAPTER X

THE SUPERNATURAL AND HUMAN THINKING

The knavery and folly of men are such a common phenomenon that I should rather believe the most extraordinary events to arise from their concurrence, than admit of so single a violation of the laws of nature.—
DAVID HUME.

IN this chapter, which will deal with phenomena sometimes interpreted as 'supernatural', no attempt will be made to discuss at any length the relations between science and religion, whose alleged opposition has perhaps been exaggerated. More important is the quite irreconcilable opposition between science and superstition. Yet the 'supernatural' status of certain psychological occurrences has sometimes been defended in the name of one or other of mankind's religions, and we shall not exclude such phenomena from consideration merely because some persons or communities have chosen to interpret them according to their religious beliefs. We shall be largely concerned with visual experiences of the kind given such names as 'apparitions', 'second sight' or 'glimpses of another world', rather than assessed as hallucinations, after-sensations, eidetic images or hypnagogic visions; and adequate consideration of these will necessarily involve us in conflict with anti-scientific attitudes which have sometimes been held by religious people.

Since religion rests on *faith*, it is as well first to consider this human quality. To some people 'faith' has come to mean 'believing what one knows perfectly well just isn't so'. Yet there is little reason to identify such intrinsically unrealistic, and therefore anti-scientific forms of A-thinking with what the early Christians extolled as a virtue. 'Faith' in its original sense—which it sometimes still retains— involves an attitude that need not be in the least incompatible with scientific investigation or with the acceptance of the products of logic, science and R-thinking in general. The religious man will have faith in his God; he may also have faith in the residual element of goodness in the worst of men. Outside the religious context, the loyal follower has faith in his leader,

children have faith in their parents, the dog has faith in his master, and people more generally have faith in those whom they accept as their friends. As William James remarks, 'Tolstoy is completely accurate in classing faith among the forces *by which men live*'. Human society is governed by faith of this kind, and it is not surprising that the quality has been regarded as morally desirable. It comprises having confidence in, and showing loyalty towards those one believes to be worthy of such trust. While faith can, of course, be misplaced, it is in itself quite compatible with reality-adjusted human thinking; and the only 'religion' which must inevitably come into conflict with science is religion conceived of as some kind of *alternative* to impartial and reality-adjusted thinking.

An unfortunate manifestation of A-thinking is the acceptance of supernatural explanations of events that can perfectly easily be accounted for in other ways. Houdini (1927), for example, records that Sir Arthur Conan Doyle persisted in regarding certain manifestations of his 'magic' as derived from mediumistic powers, in spite of Houdini's repeated and emphatic statement that everything he did was 'accomplished by natural means, humanly possible, no matter how baffling it is to the layman'. We would not deny that there is room for further investigations of certain 'supernatural' occurrences for which scientific knowledge at present provides no explanation. But our recognition of this need does not mean that we are bound to go on arguing with those tiresome people who insist on supernatural explanations of events even after these have been shown to have natural causes. Such irrational attitudes make scientific investigations of 'supernatural' phenomena unnecessarily difficult. 'Faith' of this kind comprises a direct rejection of reality, and amounts to making a moral virtue out of being illogical, unrealistic and wrong.

Certain 'supernatural' phenomena lend themselves to explanation in terms of some science other than psychology. Although these are marginal to the present analysis, we may take illustrations. As we have seen, witches were often skilled in the use of medicine and poisons, and there is good reason to believe that when psychological terrorism, suggestion and other such techniques failed,¹

¹The part played by fear and suggestion in producing the effects desired by malevolent witchcraft is admirably dealt with by Coleridge in the preface to his poem *The Three Graves*, and forms the central theme of the poem itself.

they were both ready and sufficiently well informed to use them. The fact that we do not today show undue resistance to this kind of explanation of witchcraft is in itself interesting. For as the psychologist Jaestrow (1927, p. 293) has observed, 'we can point to no comprehensive investigation by which witchcraft was disproved; it was simply "outgrown"'. In superstition-ridden ages familiar occurrences relating to illness and its treatment tended to be given supernatural explanations. Thus when plague devastated Provence the famous prophet Nostradamus (1503-66) was highly successful in his dealings with it, and these successes were attributed to his magical powers. But Nostradamus was also a trained and well informed physician. It is not difficult to account for his successes in terms of our present understanding of medical and psychological science: 'His self-confidence may have had a heartening effect, for he was a man of unquenchable courage in the presence of disease; but it seems likely he was also in possession of some kind of disinfectant, for we hear much from his early biographers of a mysterious powder which he used to purify the air.' (Laver 1942, p. 25.)

PSYCHOLOGICAL EXPLANATIONS

Other superstitions lend themselves to a psychological or psychiatric explanation. One of these is belief in the *vampire* which, it is suggested by Ernest Jones (1949), has its origin in experiences derived from the nightmare. Hallucination may also have contributed to the folklore of the vampire and perhaps also to the closely related superstitions about were-wolves. But lycanthropy—taking on the form of wolves or other animals—is also amenable to a more material kind of explanation. Rawcliffe (1952) draws attention to one of the rarer kinds of psychosis, the 'zoanthropical' form of paranoia, involving delusions of being some animal. He points out that victims attacked by such psychotics 'have been mauled and torn and partly devoured as if by a wild beast' (*ibid.* p. 266). The superstitious beliefs of a primitive society might well reinforce such delusions and mould them into certain culturally determined forms, just as 'witchcraft' has certainly provided a unitary but false explanation of many neurotic and psychotic phenomena at earlier stages of European history. In our own society there still occur such conditions as psychomotor epilepsy,

in which the epileptic attack takes the form of animated activity—not afterwards remembered—rather than collapse and loss of consciousness. Some of these psychomotor epilepsy patients will run about making noises reminiscent of wolves or other wild animals, and during such attacks are liable to engage in violence and destruction. In a community dominated by superstitious beliefs such happenings would readily lend themselves to interpretation as lapses into the state of the were-wolf, the were-leopard, or whatever the particularly feared wild animal might be.

A wide variety of different phenomena have probably at times been 'perceived' as *ghosts* and *poltergeists*. The interaction between objective events and such subjective occurrences as hallucinations and images may again be emphasized. Misperceptions of shadows, the breath of animals on frosty nights, and other such appearances would provide excellent subject matter. Again, such occurrences may be other than visual, as when the eerie noises heard in a house, and half believed to be a ghost, were shown by careful examination to result from rotation of the unoiled wheels of the gas meter.¹ The fact that several people see or otherwise 'perceive' a ghost may not present serious difficulties for natural explanation. The basis of the perception may well be something objective, and the attentions of a plumber, electrician or architect rather than a psychic researcher may be required.

The influence of cultural traditions upon more subjective forms of apparition is well dealt with by Galton: 'When popular opinion is of a matter-of-fact kind, the seers of visions keep quiet; they do not like to be thought fanciful or mad. . . . But let the tide of opinion change and grow favourable to supernaturalism, then the seers of visions come to the front. The faintly-perceived fantasies of ordinary persons become invested by the authority of reverend men with a claim to serious regard.' (Galton 1904, p. 128.) Galton adds that under such favourable circumstances the experiences are attended to and encouraged, and become more vivid as a result of being habitually dwelt upon. Such an 'alerting process' seems to play a quite important part in increasing the incidence and clarity of quasi-hallucinatory and hypnagogic experiences. Of this

¹The author can testify to the facts of this incident and although possessing neither mechanical nor 'psychic' ability accepts credit for 'exorcising' this particular ghost or poltergeist.

process Galton writes: 'We need not suppose that a faculty previously non-existent has been suddenly evoked, but that a faculty long smothered by many in secret has been suddenly allowed freedom to express itself, and to run into extravagance owing to the removal of reasonable safeguards.' The frequency with which such experiences occur even under unfavourable conditions should be emphasized.¹

The close association between ghosts and darkness suggests that A-thinking processes like dreaming and hypnagogic imaging may have been largely responsible for these products of human imagination. A number of our own subjects reported seeing 'ghosts' of the more or less traditional kind, though we classified the visualizations as hypnagogic rather than supernatural. Thus one subject reported this recurrent open-eyed hypnagogic vision: 'I see a figure draped in white approaching my bed. It is vague, but it is the figure of a woman, and I get the impression that she is a nun.' Ghosts are not invariably figures in white; they are sometimes hallucinated in the costume of a former age, and such visions were also seen by some of our subjects. One perceived with open eyes in her darkened bedroom a figure 'with thick black beard and in dark Elizabethan costume with a white ruff'. She added: 'I was seeing my bedroom as it is usually, the only unusual thing was this "ghost" moving about.' She herself emphatically rejected any supernatural explanation and regarded the experience as essentially similar to other hypnagogic visualizations.

It has been suggested that conditions of fatigue and sleep deprivation tend to blur the already indistinct frontier between hypnagogic and hallucinatory experiences. The following incident, reported by one subject, merits attention as an illustration of this fact and also for its intrinsic interest. Driving home late at night after a long and tiring day's work, he suddenly in the headlights of his car saw a bridge on which were a woman and a dog. He applied the brakes but was unable to stop in time, and he saw the woman across the bonnet of his car as he struck her. Very much upset, he got out of the car; but though he walked up and down the road for some distance he saw no woman, no bridge and no dog! While the experience itself was, of course, extremely disturbing,

¹Compare Galton's paper (1882) on 'The Visions of Sane Persons', and our own previous account of hypnagogic, hypnopompic and hallucinatory experiences in Chapters III and IV.

there seems to be no reason to interpret it as other than a hypnagogic image intensified by extreme fatigue, and this interpretation was accepted by the subject himself. Granted different beliefs, however, this is the kind of 'ghost story' which scientifically-minded people are often told and challenged to explain. Hypnagogic and hallucinatory experiences are not, of course, invariably appropriate to the naturalistic explanation of such incidents, since some apparitions may result from misconceptions of indistinct but real objects. Probably there is also an intermediate category of apparitions which have as their basis after-sensations rather than either percepts of real objects or quasi-hallucinations.

Clairvoyance has often been closely associated with visions seen in crystal-gazing. There is no reason to deny the occurrence of these visual experiences or to regard them as other than a specific kind of hallucination or eidetic image. (See Chapter II.) We have seen that crystal visions can be elicited in individuals who quite emphatically reject their supernatural interpretation. Morton Prince (1922) has drawn attention to the fact that a crystal as such is unnecessary; mirrors and many other bright objects will elicit such visualizations. Sometimes dreams also are interpreted supernaturally, even today, though such dreams do not appear to differ materially from others that are accepted merely as ideational activity centred on present or future problems and events.

We have already noted the anticipatory nature of certain hypnopompic images, and it is often claimed that some of these visual experiences are genuine cases of *precognition*—glimpses of future events that actually occur. Let us examine such a claim in the case of what we ourselves should classify as a hypnopompic image. An elderly woman awoke during the night and, on opening her eyes, saw her darkened bedroom 'full of angels'. When, shortly afterwards, her husband died in the same room, the vision was interpreted supernaturally as an omen. The two relevant events were, first, an extremely impressive hypnopompic image, and secondly, the occurrence shortly afterwards of an emotionally distressing happening. Such an association provides excellent subject matter for superstition. Frazer (1911) provided a general theory of magic in terms of such confusions about association. Skinner (1953) has suggested, on the basis of an ingenious series of experiments, how one category of superstition can be explained as the product of reinforcements by accidentally-occurring

contingencies. Perhaps the term 'reinforcement' is an inappropriate one to apply to our own example, but the process of association is somewhat similar. In this incident an associated accidental contingency did occur—the woman's husband died soon afterwards.

Yet even from our own data about hypnagogic images alone, we can assemble a lengthy list of instances in which no such association took place. For example: 'I was standing on the edge of Rubislaw Quarry watching my little sister hurtling through space and I could do nothing to save her.' As this image was followed by no such event, no retrospective supernatural explanation was given to it. Other negative cases were numerous, and some of them impressive in their content:

A pair of runaway horses galloping towards me.

I saw a girl run in front of a bus.

I was about to be run over by a train.

Once during the war I was lying in bed and I saw the image of my uncle in uniform. He was serving abroad and I was not thinking of him.

I saw myself falling over a cliff.

Another individual said that in his hypnagogic imagery 'fatal accidents came up with distressing regularity', and several of them involved himself as victim. Other subjects have reported the recurrent hypnagogic image of losing control of their car while at the wheel and running over a pedestrian.

In none of these cases have we found any evidence that the appropriate future events took place. It is the rare occasions on which such accidental contingencies *do* occur that provide subject matter for precognitive interpretations. Given such coincidence and the favourable assistance of appropriate supernatural beliefs, any one of the negative cases listed might well have provided another of those stories that people who prefer reality-adjusted thinking are challenged to 'explain'.

Laboratory investigations of telepathy, clairvoyance and precognition comprise a different field of marginal relevance to our present subject matter. Our only comment is that the actual phenomena reported by investigators like J. B. Rhine hardly seem to justify the elaborately speculative interpretations sometimes given them. Other investigators like Thouless and Soal have rightly exhibited more caution in this respect.

Our collection of negative instances may serve to illustrate in

a concrete way how superstitious thinking is favoured by the tendency to forget about the occasions when *nothing* happens. When some accidental contingency *does* occur, the well-understood tendency of human remembering to retrospective distortion also tends to operate, and the supernatural interpretation is 'improved'. A good illustration of such a process is provided by the case of Miss Moberly and Miss Jourdain and their often quoted report of meeting various characters from the court of Marie Antoinette while walking about the grounds of Versailles. We are not for the moment concerned with hallucinatory processes which are perfectly capable of producing appearances of figures dressed in the clothes of a former age; in hallucination and eidetic imagery, as in dreams, all things are possible. Nor are we concerned with the argument that the ladies were 'perfectly sane'—an argument which some people, unaware of the curious imagination experiences possible to non-psychotics, seem to find convincing. Emphasis must be put rather on the immense possibilities of retrospective distortion which have been dealt with more fully by specialists in this field.

Thus Flew (1953) points out that no record of the alleged experiences were made until some considerable time after the event; that there is good evidence of considerable mutual suggestion between the two friends before either started to write; that there are discrepancies in the various documents concerning some of the more colourful items of content; and that, finally, the dates of composition of the various documents are highly questionable. Many of the most famous pieces of 'evidence' for the supernatural present similar instances of later autistic thinking and self-deception co-operating at this stage of remembering and reporting the original events. It is with such nebulous subject matter of initial fantasy, misremembered and interpreted in terms of subsequent fantasy, that the serious scientific investigator of 'psychic' phenomena has to deal. The rigour of his methods and his patience in the face of almost every conceivable manifestation of human A-thinking deserve the respect of other scientists.

MYSTICAL THINKING

In considering mystical thinking our main concern will be with its nature rather than its validity. It has been noted that mescaline was first used by the Aztecs to produce mystical states

for purposes of religious ceremonies. Contemporary experiments with mescaline reveal that only some people react in this way, and such individuals may also produce mystical thinking under other experimental conditions such as those produced by inhaling nitrous oxide. For such persons mescaline and these other substances provide introspections which may help us better to understand the spontaneously occurring forms of mystical experience. Such subjects experience the belief or half-belief that they are somehow in tune with a 'reality' more basic than ordinary reality. What oriental mystics called the 'Veil of Maya' and which they believe hides the 'reality' behind appearance is, as it were, for the time being drawn back. William James mentions the deepened sense of significance which accompanies what he calls 'the eternal inner message of the arts' as relevant to an understanding of the nature of mystical reactions. To the writer's own introspections the mystical type of mescaline reaction has affinity with that feeling of 'inner assent' which sometimes accompanies a satisfying aesthetic experience.

If one uses the mystical idiom to describe the aesthetic experience, then the satisfaction might well be attributed to the belief or half-belief that 'Maya', or illusory appearance, had been pushed back long enough for the beholder to experience something which feels important and which he believes the artist meant to communicate. Rawcliffe (1952) describes this impression of revelation of 'ultimate reality'—of reference to an objectivity equal to or transcending that of ordinary experience—as 'the hallmark of the mystic'. Such an experience is well described in the sound-recorded words of one of our subjects under mescaline: 'Ordinarily we can all check up against a reality we can all agree about. Now I'm asking you to check up against a *reality* that only I can see.'

A characteristic of such phenomena—whether they result from some chemical agent such as mescaline, hashish or opium, or occur spontaneously without such influence—is the marked tendency for them to be described as 'difficult' or 'impossible' to communicate in words. William James regards this *difficulty of communication* as one of the most distinctive features of mystical experiences, and points out that they thus 'resemble the knowledge given to us in sensations more than that given by conceptual thought' (James 1902, p. 405). Those who attempt such verbal

communication are notoriously unsuccessful; for the audience very frequently either misses the point or impatiently abandons any attempt to understand. We have seen that lack of an appropriate vocabulary sometimes gives rise to neologisms like those of psychosis. (See Chapter VI.) It is suggested by James that music may be a more appropriate medium for mystical communications than speech, and he adds that many mystical writings are 'little more than musical compositions' and probably 'stir chords within you which music and language have in common'. Mescaline and related substances provide certain individuals with something of the mystic's (and certain artists') sense of frustration at their failures adequately to communicate their experiences.

Some of the subject matter that resists communication is of a visual kind; it appears to resemble the hypnagogic visions that made certain subjects wish they had the talent to paint them. Hypnagogic visualizations are themselves sometimes described in mystical idiom; substances like mescaline can evoke visual images of a strikingly beautiful kind, whose content, colour and lighting are immensely impressive. Among the best descriptions of such images are those of Weir Mitchell (1896) who emphasizes the impossibility of explaining in language 'the beauty and splendour' of what he saw. In one of his visions he saw a Gothic tower of elaborate and definite design, from whose projecting angles and cornices hung clusters of precious stones like 'transparent fruit' all possessed of an 'interior light'. In another vision 'an edge of a huge cliff seemed to project over a gulf of unseen depth' about which a fragment of some stuff 'began to unroll and float out to a distance which seemed to me to represent Time as well as immensity of Space. There were miles of rippled purples, half transparent and of ineffable beauty', while now and again 'soft golden clouds floated from these folds, or a great shimmer went over the whole of the rolling purples, and things like green birds fell from it, fluttering down into the gulf below'.¹

The following sound-recorded report by the writer on one of his own mescaline visions again indicates something of the inadequacy of mere words as a mode of communication: 'A deep,

¹Resemblances to hypnagogic imagery in peculiar qualities of colour may be noted. Leaning (1925) actually quotes Weir Mitchell's descriptions under mescaline to illustrate the quality of colours imaged hypnagogically.

deep well, sunk into the glistening ice—small particles of ice falling into this as into a crevasse—then an underground river. The caves were Coleridge's "caves of ice". The ice was clear and glittering, and the cave was of a deep blue.' On another occasion the same subject said of such imagery: 'You could produce masterpiece after masterpiece if you had the talent, and some people have tried.' Coleridge was one of those who *did* try to incorporate in poetry a similar vision from an opium dream. And because Coleridge was a great poet *Kubla Khan* really expresses something of his own reactions to such visions in words that for once are not unworthy of the original experience:

For he on honey dew hath fed
And drunk the milk of Paradise.

It is of some interest that Lowes, after a period of intensive study of Coleridge's poem, experienced a vivid dream of Kubla Khan's 'stately pleasure dome'. He describes it as 'like a mirage on the remote horizon of an endless plain . . . a shimmering golden dome . . . a cataract of foam which sent up a luminous golden mist that bathed the whole landscape in unfathomable amber light' (Lowes 1927, p. 40). Subjects under mescaline reported feeling that they alone had climbed a hill and seen a vision so splendid that they were acutely aware of their duty to communicate it to others. Such a feeling of obligation was quite often accompanied in our own and other mescaline experiments by an equally acute awareness that powers of communication were limited to such strictly confined techniques and talents as the subject happened to possess. These subjects felt that they had something to bring back from Paradise, but knew that, alas, they were not Coleridges.

Certain *regularities* seem to occur in these forms of human visualization. It has been noted that Mayer Gross (1954) expressed the opinion that phenomena of this kind produced by mescaline are almost identical with those produced by lysergic acid. Various investigators from Weir Mitchell onwards, as well as our own research team (Ardis and McKellar 1956), have independently noticed the similarity between mescaline-induced and hypnagogic visions. Klüver (1928, 1942) has drawn attention to 'form constants' which are common to psychotic, mescaline-induced, and hypnagogic visions. Again Wolff and Curran (1935) instance a

physician who reported the same visions during four different illnesses, measles, malaria, tonsilitis and influenza. Such observations support the view that A-thinking processes of a visual kind exhibit certain regularities irrespective of whether they are evoked by sleep or adjacent states, by a variety of different known toxic substances, by psychosis or in some other way.

When different scientific names are given to all these rather similar experiences the names refer to the conditions under which they occur. But they may also be named, unscientifically, according to whatever systems of belief a given individual happens to hold. Granted belief in some after-world—Heaven, it may be, or the 'Summerland' of Conan Doyle and other spiritualists—mescaline-induced, hypnagogic, hallucinatory or other such visions readily lend themselves to interpretation as clairvoyant glimpses of some 'other' place, its architecture and its inhabitants. Those whose supernatural beliefs involve some form of 'reincarnation' would tend to interpret such experiences in this alternative way. Both those who have the talent to record the experiences in poetry or paint and those who lack such talent seem equally to have the visions. Likewise those who lack supernatural beliefs as well as those who possess them are capable of imagination experiences which in form, content and other qualities would provide appropriate subject matter for supernatural interpretation.

Not all the statements of those who reacted mystically to the experience of taking mescaline referred to visualizations. Several other investigators have reported an experience which has been named '*presque vu*' an impression of almost, but not quite, grasping a supremely important truth. An instance of this in one of our own subjects may be quoted from the sound recording of her statement at the time: 'If you could hold on to this you'd be a terrific person. I was on the edge of grasping things of the Universe. Suddenly I saw it was the only way things could be.' This same subject remarked on another occasion during the experiment: 'I felt that if I looked a moment longer I'd realize what thought was.'

One characteristic of the mystical reaction to mescaline is an impression of *increased insight*, whether real or apparent. Evidence seems to contradict the view that such insight is invariably false. On the contrary, both mescaline and nitrous oxide may sometimes produce more or less clearly conceived ideas of a sensible kind,

though the subject himself tends to over-estimate their intellectual worth. In one of our mescaline experiments the subject felt that she had gained insight into what the world must seem like to an infant. Several believed themselves to have gained understanding of experiences of size change like those portrayed in *Alice in Wonderland*. Yet another felt himself to be more fully aware of the implications of the thought that every experience one undergoes effects an irreversible change in one's personality.

The extent to which such relatively down-to-earth ideas (to say nothing of those whose content was itself mystical) may suffer loss of meaning in the course of communication has been examined above. (See Chapter VI.) 'Mental ataxia', the tendency to say or write something different from what one meant to say or write, is in itself a major obstacle to effective communication of these or, indeed, any ideas. Again, perseveration—the autonomous recurrence of words one has previously used or thought—can be another impediment. A good illustration of such perseveration is provided by Steinberg's subject who, under nitrous oxide, repeated 'that's all right . . .' five times, one after the other 'and with great emphasis'.

Another characteristic of these experimentally produced experiences has a possible bearing both on the impression of increased insight or understanding and on the accompanying difficulty of communication. Those who took mescaline were often aware of *subsidiary associations* to their thinking that seemed important to them. One individual likened the relation between these and the main themes of his own and the experimenters' thinking to that which holds between the text of a book and its footnotes. Another reported being 'so long chasing hares off the pathway through the woods that I lost the main path', and added: 'I didn't mind chasing the hares.' (Cf. Chapter VII and diagram, pp. 99, 100.) Mescaline may well increase the tendency that Stekel has noted for thought to be a 'polyphony'. Attention directed to subsidiary chains of association may both provide insights not ordinarily available and impede effectiveness of communication about the principal themes under discussion.

We have noted the part that inhibition plays in reality-adjusted thinking. Such inhibitory processes seems to be effective in maintaining control of the level of abstraction at which thought proceeds and in excluding the logically irrelevant. *Absence of*

inhibition is noticeable when A-thinking occurs—whether hypnagogically, in dreams, in psychosis, under mescaline, alcohol or some other such substance. Sometimes 'inspiration', in the sense of a new and useful reorganization of ideas, seems to occur as a result of this removal of inhibition; *in vino veritas* is sometimes valid in this sense of increased insight. On the other hand, the impressions of increased understanding may be illusory and result in lack of judgment. Superficial puns or other worthless thought products may seem, for the time being, to incorporate important truths. Thus William James (1896) during a nitrous oxide experiment was impressed by the deep significance of a thought which occurred to him: 'What is a mistake but a kind of take'? Associated with these occurrences are several other processes observed in our own experiments. One of these was a tendency to entertain two or more seemingly incompatible thoughts at the same moment. This experience led some of our subjects to belief, or half-belief, in identifications which were not only improbable but also mutually incompatible: such as 'I'm a window and the room at the same time'. Sometimes the inability to form accurate objective estimates of time in tests that were made was accompanied by an inclination to give two or more different estimates. These disturbances of time perception seem to occur commonly with mescaline, lysergic acid, hashish and nitrous oxide experiments.

Subjects would sometimes respond in mystical ways with crude and inaccurate judgments, often expressed in highly dogmatic language and regarded as having deep significance. One one occasion an experimenter presented the subject with a translation of one of Hegel's more obscure and cryptic passages. The subject expressed considerable admiration and declared that this passage gave a good account of her experiences. She was, however, unable to explain this sweeping identification in other words, or explain what the passage meant. During the same experiment the subject was presented with one of the statements produced by William James under nitrous oxide, that had seemed to him at the time to embody an important 'truth'. The statement read: 'There's no difference but differences of degree between different degrees of difference and no difference.' The subject's reaction to this was very interesting. She remarked: 'That's either absolute utter nonsense, or it's so true that it's almost the only thing worth writing down.' The crudely primitive nature of this statement will be noted, and its

all-or-nothing quality,¹ the unwillingness to entertain any intermediate possibilities between two violently opposing extremes. The effects of mescaline on his thinking were well summarized by another subject who said that 'tomorrow' he would be better able to expound what Kant *actually said* about time, but 'today' felt better able to explain what Hegel *really meant*.

It will be noted that many of these reactions involve extremes of certainty like those sometimes noticeable in statements by mystics and others who resort to supernatural explanations. Our own interpretation of this *certainty phenomena*, arrived at from observation of our mescaline subjects, can best be understood by reference to anxiety. Anxiety may be 'free floating'; the subject does not fear anything in particular but is rather seeking some object or situation to which he can attach his fear. Phobias seem to occur through anxiety, which is primary, becoming attached to something which is afterwards found; in this way the anxiety is rationalized and made more endurable than in its original 'free floating' form. Our observation of statements of certainty made under mescaline suggest a similar process. Such certainty appears to be 'free floating'; the subject is not certain about anything in particular but rather seizes on something about which he can be certain. Huxley's (1954) account of a mescaline experiment on himself provides numerous examples of this reaction.² For example he 'knew' that Botticelli and other artists 'had looked at draperies with the same transfigured and transfiguring eyes' as had been his that morning. Such irrational specific certainties suggest the rationalization of free floating feelings of general certainty, of the type which mescaline seems to produce. Our own subjects' certainty reactions were, at times, equally alarming in their readiness to attach themselves to all sorts of improbable and impossible

¹Such all-or-nothing responses represent regression to reaction of the kind which Rivers (1920) has examined in detail under the name 'protopathic'. The opposing concept of 'epicritic' would apply to the gradations of discrimination associated with cortical control.

²Huxley's books (1954, 1956) on this subject repeatedly overlook the fact of individual differences. As Zaehner (1956) has recently pointed out, Huxley 'continues to write as if his own experience was typical of all mescaline takers'. Not merely must it be stressed that only some people react to mescaline mystically, as Mr. Huxley did, but as Professor Zaehner rightly states, there are also different types of mystical reaction.

claims. Analogous phenomena occur only too readily in everyday life, where a mechanism of 'free floating certainty' may also operate.¹ Piaget's studies of human development suggest that similar certainty judgments characterize a particular stage of the child's intellectual growth, to which in these experiments it may be a regression.

It has been implied that the mystical forms of thinking that we have discussed have both their productive and less useful aspects. Discriminating between differences and noticing similarities are both useful forms of thinking. Mystical thought is not particularly efficient at the former task. It is characteristically like the thought of the lover who (as Freud has pointed out) in flat contradiction to all the evidence of reality asserts that he and his beloved are one. William James (1902, p. 387) supports the view that the drunken consciousness resembles mystical thought in this respect: 'Sobriety diminishes, discriminates and says no; drunkenness expands, unites and says yes.' Yet this very weakening of the tendency to discriminate between differences, in favour of identification of far from obvious similarities, may provide new insights. We may note the tendency of such a thinker as Hegel (1770-1831) to reject distinctions which most other people have regarded as essential. Perhaps, as James has suggested (though for slightly different reasons), there was in Hegel's case a predominance 'of mystical moods like this, in most persons kept subliminal' (James 1902, p. 389; also James 1896). Insights deriving from such moods are often spurious, but they may in other instances prove valid and useful—since these feelings of deep significance (resembling those of certainty and similarly 'free floating') may sometimes attach themselves to insights of varying but real worth. Some of the connections giving rise to these impressions of insight appear to resemble those of psychosis.² But others that occurred in the experiments seemed to resemble neither those of psychosis nor of normal thinking, a fact worth noting as a basis for further inquiry into mystical responses.

¹This view is consistent with the evidence of Klein, Frenkel Brunswik and others (Blake and Ramsey 1951) that there are certain types of people who find suspended judgment and tolerance of uncertainty virtually impossible to sustain.

²See Chapter VI and VII. We have observed certainty responses very much like those of mescaline in some schizophrenics.

The phenomenon for which the term *half belief* has been suggested plays an important part in 'supernatural' forms of human thinking.¹ Investigations of superstitious behaviour reveal that many people retain feelings about superstition after it has been intellectually rejected. Many who do not believe that throwing salt over their shoulders has any reference to their future destiny nevertheless manifest evidence of half belief. For example, they might tend to throw salt over their shoulders if they happened to spill it at their own wedding, or might be reluctant to walk under a ladder on their way to an important examination.

Coleridge has discussed with great insight such half belief in its relation to imaginative writings about the supernatural. Referring to his *Lyrical Ballads*, the great poet of the supernatural records his aim to produce in his reader 'a semblance of truth sufficient to procure for these shadows of imagination that willing suspension of disbelief for the moment, which constitutes poetic faith' (*Biographia Literaria*, Vol. II, Chapter 14). Half belief has many interesting manifestations and may exert considerable influence on human attitude, overt action, and particularly judgment. In this last aspect the psychological processes involved have been rather cynically analysed in a comment by a recent novelist: 'It isn't what people believe or disbelieve; it's what they have an "open mind" about; it's that which leaves them just so open.'

These attitudes of half belief are widespread in relation to most of the occurrences to which the term 'supernatural' has been applied. Those who intellectually reject belief in ghosts may under appropriately frightening circumstances experience momentary or more prolonged half belief, a weakening of their conviction that these things are not so. Half belief often plays a part in response to stage magic, accompanied by feelings of frustration and dissatisfaction when told how a trick was actually performed. Half belief in its relation to delusion has already been discussed in terms of mescaline experiments. It is also relevant to an understanding of certain mystical types of reaction to mescaline, of which brief illustration can be given from the writer's own introspection.

Under normal circumstances he would not accept the view that mescaline imagery is a manifestation of a more real world such as

¹ McKellar 1952, pp. 320, 329.

thinkers like Plato and Kant believed to lie behind the world of appearance; nor would he accept it as visions of the pre-natal world which Plato and Pythagoras believed in and Wordsworth wrote of in his 'Ode on Intimations of Immortality'; nor again would he accept them as evidence of some collective unconscious of the kind postulated by Jung. Yet at times during the experimental periods he accepted one or other of these beliefs. His more typical reaction, when subject, might better be described as half belief, as Coleridge's 'willing suspension of disbelief for the moment', or some weakening of his normal conviction that these colourful conceptions are not true. The nature of this reaction, and the more general relevance of mescaline phenomena both to mystical thinking and to delusion, cannot be conveyed accurately without some emphasis on the phenomenon of half belief.

It is evident both from the literature of other experiments and from our own that certain people exhibit not the slightest tendency to mystical reactions under mescaline—even of the half belief kind; and the importance of personality differences in this respect provides one interesting field for future research.

Although we have not attempted a comprehensive examination of the whole field of the supernatural, we would stress that in relation to 'the supernatural' in general it is difficult to overestimate the importance of gross deception on the one hand and human gullibility on the other. It must also be remembered that a measure of half belief in the supernatural is by no means incompatible with intellectual rejection, especially when strong emotion is involved. For instance, it is reported of Jeremy Bentham, the Utilitarian and arch-debunker of superstitions, that he had been so terrified by ghost stories in his childhood that he could never sleep alone at night to the end of his long life. Bereavement and the fear of death have converted many people to spiritualism; and in this connection a distinction must be made between the profession of scientist and the scientific attitude. Professional scientists have sometimes been curiously gullible in these matters, and it may well be that scientists as a group are *not* the most relevant group to defend realistic thinking in this field. Conjurors like Houdini on the other hand have, in the séance room and elsewhere, sometimes been prominent in exposing the techniques of fraudulent mediums.

By so doing they have provided natural explanations of alleged events in terms of which science has so often been asked to modify its basic structure.

It is not easy, and probably not possible at the present stage of our knowledge, to explain *all* 'supernatural' phenomena scientifically. None the less, the habit of continuing to insist on supernatural explanations when alternative and very plausible natural explanations are available is interesting and itself needs explanation. Some of the principle mechanisms of mental life that govern self-deception, or ego defence, have been enumerated by Anna Freud (1936); probably few of them have not been used in defence of 'the supernatural'.

Recently the experiments alleged to support 'clairvoyance' and 'extra-sensory perception' have been given highly critical re-examination from this standpoint.¹ But these experiments in card guessing lie outside our field. Our own concern has been with those visual phenomena that have most often been interpreted supernaturally. We have sought to illuminate the interpretations from our own previous studies of the phenomena that give rise to them; and have found that it seems unnecessary to interpret apparitions supernaturally when quasi-hallucinatory processes explain them just as well. As Rawcliffe (1952, p. 18) has put it: 'To the superstitious or ignorant person, a hallucinatory figure is a ghost, whereas to the psychologist it remains merely a visual hallucination.'

¹The reader interested in this field is referred to the very interesting article by Price (1955), and a forthcoming book by Hansel (cf. Hansel 1955).

CHAPTER XI

SCIENTIFIC THINKING

To be puzzled where everything is clear to others, where they merely ask: 'What is there to understand?'—to see a riddle there still—need not be a mark of stupidity; it may be the mark of a free mind.—THEODOR REIK.

'SCIENCE' results from a cumulative process of reality-adjusted thinking. It deals with the classification of natural phenomena, with explaining why they are so and not otherwise, and with verifying these explanations. It is a collective human enterprise whose goal is a realistic understanding of nature reached by logical reasoning and verified by observation and experiment. The alternative explanations or hypotheses with which it deals are considered on their merits and accepted or rejected on impersonal grounds.¹ If one investigator does not himself take account of some alternative to the explanation he wishes to uphold, then another will eventually do so; and if this new alternative stands testing against reality better than the original, then it will replace it. In this way the impersonal, objective nature of scientific theory is achieved and retained. The connections of scientific thinking are logical, rather than of the merely associative kind which, as we have seen, predominates in A-thinking.

These general statements describe the *scientific ideal*—the standards by which a scientist, in so far as he is scientific, will seek to govern his thinking. Individual scientists naturally at times fall short of this ideal. They may be prejudiced, superstitious, or otherwise dominated by A-thinking, on certain occasions or in certain areas of their thought. Moreover, scientists like everybody else are subject to fantasies, dreams, hypnagogic imagery and other

¹See McKellar 1952, pp. 7f. 'Science involves reasoning from the particular to the general on the basis of what is observed . . . Certainty cannot be attained by such inductive reasoning. Neither psychology nor any other science can maintain its conclusions with certainty, but only with probability. When probability is low the term "hypothesis" is used, when probability is high we speak of a "scientific law". Between hypothesis and law is a quantitative and not a qualitative difference, since scientific probability invariably falls short of certainty.'

manifestations of A-thinking, of which they are sometimes able to make use. But our concern at the moment is with their activity as scientists—the purely scientific thinking that predominates when they are being scientific. Science itself, being a collective not merely an individual human enterprise, tends to approximate towards ideal goals. Its progress may experience delays and is certainly not 'inevitable'. Yet on the whole time is on its side, since there is a unity in realistic human thought which is not shared by the numerous and mutually incompatible systems of 'certainty' that oppose both it and one another. Science comprises the most logically consistent body of reality-adjusted thought that man has devised, and it proceeds by a process of continual refinement of its logical, reality-adjusted methods.

A characteristic of the kind of thinking called 'scientific' is its developmental maturity. Other systems have been devised for explaining the universe, such as those we call 'magical', 'superstitious' and 'pseudo-scientific'. These differ from the scientific alternative in that they either do not withstand attempts to verify them, or are so designed that their verification (and falsification) is not possible at all. Evidence that these systems are developmentally immature and their scientific alternative developmentally mature is provided by Piaget's studies of childhood thinking. (Piaget, 1926, 1928, 1950.) These studies demonstrate that the intellectual functions of inventing explanations on the one hand, and of verifying such explanations on the other, are different and develop at different ages. Before the age of about seven to eight years the child is capable of producing explanations, but it is not till later that he becomes concerned with their truth or otherwise. Science, therefore, in its characteristic concern with verification and falsification represents the mature rather than the developmentally earlier form of thinking. Significantly enough, Piaget draws attention to the influence of social interaction in producing this interest in verification. He writes: 'We are constantly hatching an enormous number of false ideas, conceits, utopias, mystical explanations, superstitious and megalomaniac fantasies—which disappear when brought into contact with other people.' (1928, p. 204.) It is by such a process of interaction with both the criticisms and the constructive ideas of his scientific colleagues that the individual scientist's thinking remains mature and reality-adjusted; concerned, that is, with verification and falsification.

As Piaget has elsewhere put it, 'proof is the outcome of argument'—at any rate among R-thinking people with a common discipline.

In a second important respect Piaget's studies of the development of individual thinking help us to define the forms of thought we call 'scientific' as characteristically 'adult' and 'mature'. This concerns the 'certainty phenomenon' which we have already considered in the last chapter. Associated with the young child's lack of interest in verification Piaget and his students found evidence of a strong tendency towards certainty. Other investigators, for example Pierre Janet, have also drawn attention to what they call 'the stage of belief', of which Piaget remarks: 'One of the most striking things one finds about the child under 7-8 is his extreme assurance on all subjects. . . . "I know!"—such is the only proof that is used for a long time in childish logic.' (1928, pp. 202-3.) We have seen that certainty of conviction is a feature of some modes of thinking that occur under the influence of substances like mescaline; in this case they may be experimentally produced 'regressions' to earlier forms of thought. Some adults do not progress beyond this primitive kind of thinking, and one of the most general statements we can make about their thought is that it is 'unscientific', by which we mean that it is not reality-adjusted.

Science has little to do with certainty, and individuals who are influenced by the scientific ideal are usually ready to admit how much they *don't know* about matters on which they are often extremely well informed. Those people who regard mere certainty as 'evidence' will often misinterpret the scientist's caution and his unsatisfied curiosity in the face of nature's complex problems. But scientific thought is concerned to assess the more probable and the less probable explanation according to the evidence available. It proceeds by cautious estimations of probabilities checked in every possible way by realistic modes of verification. It is equipped with expert knowledge of the numerous self-deceptions and errors exhibited by human thought and perception. The weakness of opposing autistic systems of thought lies in the fact that they claim certainty and tend to be mutually incompatible. There is no way of choosing between them except by showing greater intellectual humility and using the realistic, more adult technique of thinking that is characteristic of the scientist.

THE PROCESS OF EXPLANATION

The word 'explanation' as it is commonly used refers to a number of different processes. For example, in one sense of the word a man 'explains' when he conveys his ideas to another person. This process of communication we shall provisionally call *exposition*. Somewhat different is the 'explanation' that involves further efforts—a second or third attempt—to convey one's meaning to hearers who have failed to understand. For example, some member of an audience may ask a speaker to 'explain his meaning', which the speaker does by reformulating his exposition in different words and probably using an alternative mental model. Such 'this-is-what-I-am-trying-to-say' activity will provisionally be called *re-exposition*. Thus the protest in Byron's *Don Juan* against Coleridge—'I wish he would explain his explanation'—might be translated into our suggested terminology as: 'I wish he would re-expound his exposition.'

Both exposition and re-exposition have an obvious and important part in science, as in art and philosophy. Yet it is a third and different kind of activity, namely 'accounting for', which is of central concern to science, and it is for this activity that we shall reserve the word *explanation*. The scientist, or indeed the layman, may seek to explain a natural event by giving an account of why it is so and not otherwise; and we shall restrict the word 'explanation' to the sense in which it is defined by Warren's *Dictionary of Psychology* as 'the description of a complex event plus evaluation of the factors involved, with the aim of showing how or by what processes the antecedent situation was transformed into the later situation'. For example, Darwin may be said to have provided a *scientific explanation* of a large number of previously unrelated biological occurrences by his theory of evolution through natural selection. Scientific explanation, then, is of this third kind. It seeks to account logically for occurrences, and it remains reality-adjusted by its constant concern to verify or falsify its findings.

The relevance of exposition and re-exposition to the communication of scientific explanations must be noted. Analogies such as we have called 'mental models' (see Chapter V) play a large part in this process of communication, whether it takes the form of exposition or re-exposition. We have seen that such mental models are limited to those available to the thinker through his primary

or secondary perception. They will also reflect their author's life history, personality and interests; and when he comes to exposition they will be further restricted by what he believes his audience to know. For instance, a given thinker may himself have a knowledge of symbolic logic or some complex mathematical system such as set theory. These he may use in his private thinking when seeking to explain natural events. But in exposition of his thought he can use them only to a highly specialized audience. If he employs such models in any genuine attempt to communicate his thoughts, he does so on the implicit (or explicit) assumption that in this respect his audience's secondary perceptions have overlapped with his own.

As Theodor Reik points out in the words that head this chapter, a refusal to accept what others regard as explanations may be an important factor in the progress of human thinking. Many people devote their intellectual lives to solving problems which most of humanity regards as explained already or whose very existence it does not suspect. There are wide individual differences in what Reik calls 'the courage not to understand', and in readiness to let one's curiosity be satisfied by an explanation.

Scientific and other forms of explanation may be classified in such terms as 'true or false', 'valid or invalid', and 'appropriate or inappropriate'. In examining the relevant psychology, however, we shall adopt the more neutral concept of 'satisfying or unsatisfying', and shall treat as an 'explanation' whatever proves satisfying to its author and his audience, regardless of its scientific value. It is an interesting fact about explanations that what is perfectly satisfying to one individual may be rejected as completely unsatisfying by another. We have already seen this difference at work in the literary field, in the case of Livingstone Lowes's enquiry into Coleridge's poems. (See p. 146.) This aspect of explanation has been well discussed by Bridgman in relation to thinking in general, and by F. V. Smith (1951) in relation to psychology —the science with which we are particularly concerned. Bridgman writes: 'The essence of an explanation consists in reducing a situation to elements with which we are so familiar that we accept them as a matter of course, *so that our curiosity rests.*' (Bridgman 1927, p. 37, italics mine.) The basic assumptions of a given individual, of the age and cultural area in which he resides, will influence his assessment of what is familiar and ultimate.

The fact that a thinker allows his curiosity to rest and stops thinking, at least for the time being, is evidence of his having attained a satisfying explanation. For instance, during a vigorous intellectual discussion one of the writer's colleagues remarked of the theory he was advancing: 'I've found this picture useful. I've found it useful because it stops me looking for another one.' The speaker in this instance used the word 'picture' for what we have called a mental model, and his words describe a process that may be merely a stage in the advance towards a still more satisfying explanation. Sometimes, however, such mental models can become unrealistically rigid. They may be misinterpreted as ends in themselves rather than mere means to scientific understanding, and in this way can impede rather than assist the progress of human understanding.

Besides individual and cultural differences of readiness to let one's curiosity rest, there are also occupational differences. Thus philosophers, as a group, tend to seek explanation of an idea long after scientists have accepted it as ultimate and self-evident. It has sometimes been maintained that this difference between the two specialists means that the 'metaphysical' problems that concern philosophers are meaningless. But it may merely mean that the explanations which satisfy scientists are of a different kind from those which satisfy philosophers. William James took this latter view when he described metaphysics as 'only an unusually obstinate attempt to think clearly and consistently. . . . The special sciences all deal with data that are full of obscurity and contradiction; but from the point of view of their limited purposes these defects may be overlooked.' (James 1892, pp. 460-61.) The 'obstinacy' to which James refers is a relative matter. It results from the criteria by which different categories of people judge an explanation to be satisfying. The scientist's criteria render him at once more curious than the layman and readier to let his curiosity remain unsatisfied for a long time. The scientist and the philosopher are both of them curious, both of them tolerant of unsatisfied curiosity. In these respects both differ from the layman. They differ *from each other* not only in their criteria of satisfaction, but also in the nature of the questions they ask and in the kinds of answer that will satisfy them.

Historical factors and the passage of time naturally affect both the kind of problems with which thinkers concern themselves

and the solutions they accept as satisfying. Langer (1948) has given much attention to this problem. She argues that 'the philosophy of an age' is characterized more by its way of formulating problems than by the solutions it arrives at. She instances the Ionian philosophers who were the forerunners of the physical scientists in their search for an enduring 'something' that persisted despite change and decay. Later Socrates added a new intellectual dimension by introducing the idea of value. With Christianity came more new concepts. Yet as Langer points out, the theologians of the Middle Ages never used concepts approaching the abstractedness of algebra. It was with later thinkers, moreover, that the concept of fact emerged into importance and more recently philosophers and other thinkers have become concerned with the concept of symbols. To Langer's account we might add that certain new ideas and information helped thinkers to distinguish realistic explanations from magical ones, as when astronomy became distinct from astrology, and chemical science from alchemy. Of this important development Laver has observed that 'the sharp distinction between astronomy and astrology which the modern world takes for granted would scarcely have been understood by the sixteenth-century mind' (1942, p. 20). Consideration has been given elsewhere to the dependence of what are looked on as 'obvious' and 'common-sense' explanations upon the prevailing traditions of the age and culture in which a thinker happens to be living (McKellar 1952, pp. 10 f.).

It is probable, however, that in every age and every culture thinkers have *individually* differed in what they were prepared to accept as satisfying explanations and in their readiness to allow their curiosity to rest. Differences of imagery and of the various imagination experiences previously discussed (see Chapter IV) seem highly relevant to an understanding of these variations. As Galton half seriously suggests, if the spider were to visualize numbers it would very likely do so 'in some web-shaped form', whereas the bee would probably image and think about its numbers 'in hexagons'. He contends that in the field of human thinking 'different persons have natural fancies for different lines and curves' (Galton 1904, p. 88). Number forms seem to represent merely a developed version of such preferences which, we would suggest, tend to reflect differences of individual past experiences. We may turn to one of the ablest introspectionists in the history

of psychology for an account of his own imagination experience and consequent thought processes.

Titchener writes: 'As I read an article, or a chapter of a book, I instinctively arrange the facts or arguments in some visual pattern . . . I understand, and to that extent I enjoy, an author whom I can thus visualize. Contrariwise, an author whose thought is not susceptible to my visual arrangement appears to me obscure and involved.' (1909, p. 10.) Titchener's influence on psychology has been very considerable, and it seems likely that—together with the influence of his thought—there went the influence of the markedly spatial tendencies of his ways of thinking. It is hardly surprising that one of those who vigorously opposed the eidetic-imager Titchener's whole conception of psychology was J. B. Watson, whose own visual imagery is known to have been poor, and whose theory of thinking as 'sub-vocal talking' suggests how his own thought operated.

A vivid image or a clearly defined mental model may perform an adverse function by allowing a thinker's curiosity to rest much too soon when no real explanation has, in fact, been found. An instance of this may be taken from an otherwise excellent textbook of psychology.¹ The writer of one chapter is concerned with explaining why it is easier to remember what one has put into words (either in speech or sub-vocally) than what has remained unverbalized. The reason, we are told, is that 'the telescoping of a complex object into a verbal formula is so compact that it gets out of the way of other recollections'! (*ibid.*, p. 195). Some readers may be satisfied with this explanation. A number of a group of elementary students to which it was presented accepted it as satisfying. But others agreed (independently) with the present writer that the psychologist concerned had become a little lost in the irrelevant spatial implications of his own mental model. These implications were well brought out by another psychologist² to whom the extract was submitted, and who wrote: 'You can't telescope an object into a verbal formula. A telescope may be compact, but it can't "get out of the way" of anything, and recollections aren't things.' Others may agree that acceptance of such an 'explanation' is merely allowing one's curiosity to be satisfied by a misleading spatial model.

¹Boring *et al.* 1948.

²Professor T. H. Pear.

THEORY AND SCIENTIFIC UNDERSTANDING

The purpose of any science is to provide within its given field of natural phenomena a realistic understanding, compatible with the explanations of other branches of science. Because of the refined R-thinking characteristics that distinguish the finished products of science one may overlook the importance of those autonomous processes of creative imagination which contribute, along with reasoning, to scientific thought products. Max Planck in his autobiography not only stresses the importance in scientific thinking of accurate and painstaking attention to detail, but adds that the pioneer scientist must also possess 'a vivid intuitive imagination for new ideas not generated by deduction, but by artistically creative imagination' (quoted Hawton 1952, p. 140). In referring to this statement Hawton adds: 'The construction of a hypothesis calls for the use of the creative imagination as much as the writing of a poem.' What Hawton says of a hypothesis might also be said of a scientific experiment.

Awareness of this resemblance between scientific and artistic thinking in their creative and imaginative aspects is not merely important to the understanding of the psychology of scientific thinking. It is also relevant to that insight into one's own thinking so valuable to theorizing. Both the use of a mental model in thought, and the awareness of its potential dangers, are well illustrated by H. G. Wells's remark: 'The forceps of our minds are clumsy things, and crush the truth a little in the course of taking hold of it.' But mental models are less likely to mislead those thinkers who recognize them as products of their own thought; who are aware that they are not something one can 'see' in nature itself, but intellectual tools used for helping us to understand what is observed. Scientific understanding proceeds less by discovery and more by invention than is sometimes recognized. Scientific principles are not 'discoveries', but rather ways of conceptualizing some aspects of our universe. As the philosopher Wittgenstein (1922, p. 39) has remarked: 'We make to ourselves pictures of facts. The picture is a model of reality. . . . It is like a scale applied to reality.'

It is desirable, as Titchener once said, to 'carry your theories lightly'. For a model or theory as a means to an end is not identical either with the natural processes on which it throws light,

or indeed with the understanding of these processes which the theory itself should provide. Despite a measure of half belief to the contrary, it is simply not true that we feel any bump as we cross the equator, the tropics or the Arctic circle. These things are thought products of geographers, not aspects of nature. As Eysenck has pointed out, it is important to rid one's thought of the error underlying much human thinking, namely 'that scientific concepts refer to things which actually exist, and that the scientist's cleverness lies in isolating these really existing things and measuring them' (1953, p. 20). The same warning applies to scientific laws which, to quote Thurstone, are not something which have an 'independent existence' that the scientist 'is fortunate to stumble upon' but have the quality of 'man-made invention'. Thurstone adds: 'A scientific law is not a part of nature. It is only a way of comprehending nature.' (Quoted Eysenck, *ibid.*)

As we have already seen in the case of a supposed 'explanation' of the superiority of verbal recollection, confusion arises if we treat abstract ideas as though they were concrete 'things'. It is, for example, important to remind ourselves that the Freudian 'unconscious' is a way of talking about certain aspects of human behaviour; and a philosopher with acute insight once remarked to the writer about the psychoanalytic unconscious: 'There is no such *place*!' Such insight is perhaps even more valuable in psychology than in other sciences, because of the tendency for many of its ideas to find expression in spatial metaphors. Yet the dangers of similar confusion exist in other sciences, and the whole concept of scientific principles as *parts of nature* may seriously impede the progress of human knowledge. For this reason alone the psychology of scientific theorizing and scientific understanding deserves careful examination.

In a presidential address to the Canadian Psychological Association Hebb argues that the kind of understanding at which science aims involves two important components, *both* being essential. The first of these is to have a fully intelligible—and thus oversimplified and unreal—theory or model of the phenomenon under study. The second is to have an awareness of the incompleteness and deficiency of one's own theory or model. Hebb's two essential components of scientific understanding provide a point of perspective from which we shall view the theoretical needs of psychological science.

At psychology's present stage of development there is a need at once for constructive theorizing and for 'insight' into the limitations of one's thought products within the actual realms of theorizing; for theory, that is to say, provided by individuals who are aware of the danger latent in that oversimplification which constructive theorizing must inevitably produce. Like other sciences psychology has suffered not only from those who believed themselves to be wholly right, but also from those who chose to regard their theories as reflections of nature—as discoveries rather than intellectual inventions. Professor Hebb himself, one of the leading theorists in contemporary psychology, has been singularly free from both these errors. It is interesting to note how clearly his major work (Hebb 1949) exemplifies the healthy tendency to 'carry one's theories lightly', perhaps because of his own insight into the second and neglected component of scientific understanding.

Some emphasis on this trait of 'insight' and attention to the actual psychology of theorizing (at a time when much theoretical work remains to be done) may help psychology to avoid errors made by other sciences at the stage of development that it has now attained. One matter that certainly requires attention is the huge accumulation of words traditionally used in psychology that incorporate mental models. Such models are implicit analogies, and should be examined before the fact that they *are* analogies has been wholly forgotten. We might instance the frequent use of words like 'incubation' in connection with the psychology of thinking, the 'feudal system' model of personality as a 'hierarchy', and the Industrial Revolution concepts of 'mental energy' and 'drive'.¹ To these we may add the concept of 'resistance' at the synapses, in which instance a preference for the alternative plumbing or electrical interpretations of 'resistance' may well affect our assessment of the relative importance of the chemical and electrical phenomena which both play their part in the transmission of nerve impulses. (Cf. Chapter V.)

THEORY CONSTRUCTION AND MODERN PSYCHOLOGY

Hebb's view of the *two* important aspects of scientific understanding leads him to make an overall assessment of the history

¹Woodworth, introducing this model, had in mind the notion of the drive of a machine.

of scientific psychology. His standpoint is in close accord with the argument of our analysis of thinking and imagination, which is heavily indebted to 'associationist' psychology. Hebb argues that the main tradition of psychology has been associationist, 'through Hobbes and Locke and the Mills, to Wundt and Titchener; and later, in a closely related line, Thorndike, Watson, Holt and Hull' (Hebb 1953). He goes on to assess the *kind* of contribution that the associationists were concerned to make: 'These men were narrow; they were wrong; and without them, without the simplification they achieved, modern psychology would not exist' (*ibid.*, p. 101). Hebb here identifies this tradition of psychological theory with the first of the two tasks of scientific thinking—the construction of a model or theory. The exponents of this theory, which has had a variety of names—'associationism', 'behaviourism', 'neo-behaviourism', 'learning theory' and 'behaviour theory'—were opposed by a different tradition, namely 'Gestalt psychology'. Hebb regards Gestalt psychology and its derivatives as concerned with performing an essential but different function; it has contributed to the second important component of scientific understanding, being a reminder of the error of over-simplification. He writes: 'Gestalt psychology is not a theory, but a running battle against theory. . . . All this latter group are better understood as rebels than as theorists' (*ibid.*, p. 102). Hebb refers also to a third tradition in psychological development, that of psychoanalysis, whose importance he admits. But he argues that the weakness of this third development has been its failure to integrate itself adequately with psychology's central development, 'with one form or another of learning or association theory'.

That Hebb's judgment may be a very sound one is suggested by the vigorous activity with which many experimentalists from the associationist camp are tackling this very task of integration with psychoanalytical psychology. Considerable interaction between psychoanalysis and contemporary behaviour theory is in progress, particularly in the United States,¹ and it is probable that the main stream of future development in psychology will be the product of just this interaction. There are certainly natural affinities in the central ideas of the two movements, however different the words in

¹Major works in this field include Dollard and Miller 1950; Mowrer 1950; and Mowrer *et al.* 1953. Progress in Britain and Europe has been slow in this field.

which they are formulated. Moreover, psychoanalysis is strong in just that quality in which Gestalt psychology is also strong and the associationist tradition extremely weak—namely awareness of the dangers of over-simplification. Conversely, if psychoanalysis is strong in its insight into the complexity of behaviour, it is weak in its methodology, its ability to formulate verifiable explanations, and indeed in interest in verification and falsification at all.¹ It is in precisely these respects that modern associationism, behaviour theory, is strongest.

Few of those who are sympathetic to psychoanalytic thought, and genuinely concerned to reconcile it with other aspects of psychology, would deny the immense amount it could learn from Clark Hull's rigorous and sophisticated methods of verification. Hull contends that 'one of the very best tests of an hypothesis or explanatory system is its ability to deduce correctly the results of experimental observations not yet made' (1930, p. 253). Of this test, which is an admirable one for R-thinking explanations, Hull adds that it is a severe but fair one, and that 'no system should shrink from it'. The position of psychoanalysis in the history of scientific psychology—either as a rejected instance of autistic thinking or perhaps as part of its future central tradition—will certainly depend on its defenders' readiness to face and satisfy criteria of this kind. There is much it can learn in this matter from the modern associationists, the behaviour theorists.

Associationist psychology has certainly shown narrowness and tendencies towards over-simplification, thereby constantly needing correction of bias. Yet it has provided not merely the central core of psychological science but also a core which psychoanalysis might well have assimilated at an earlier date.² If the future development

¹The psychoanalyst often accuses his critics of self-deception of the ego-defensive kind. It is perhaps a fair answer to remind him of the developmentally early origin of the activity of seeking explanations, and the developmentally late origin of the activity of being concerned to verify and falsify explanations: precisely the attribute in which psychoanalytic thought has itself exhibited much evidence of 'fixation' or 'regression'. There seems no reason why *both* parties to such controversy should not pay serious attention to the criticisms mentioned, in the interests of the kind of 'insight' whose importance Hebb has stressed.

²The slowness of this assimilation is exhibited by Rapaport (1951) who has edited, reprinted and translated a large number of pioneer contributions to the psychology of thinking. Yet on page 7 of his 786-page volume he writes: 'No classic associationist, conditioned reflex or conditioned

of scientific psychology is to be the result of this interaction between different traditions, then the contribution of Gestalt psychology (and its derivatives like field theory and group dynamics) will probably be substantial also. This contribution might well be conceived of, in Hebb's phrase, as the product of a 'running battle' against whatever rigidities and over-simplifications creep into the new orthodoxy. Williams (1954) has suggested that the winners among the 'schools' that once divided psychology have been 'neo-behaviourism' and 'neo-Freudianism'. He adds that the modifications symbolized by the prefix 'neo-' had many of their roots in the 'ancient antagonist', Gestalt psychology. This is owing to a danger that the form, the mental models, in which scientific thought is stated may impede understanding and assimilation of its content. Dislike of the models that have become the symbols of an opposing school of thought may partially or completely seal off the work of one thinker from another, until some third thinker notices that they are *both* saying something worthy of impartial attention.

The more open-minded concept of theorizing which Hebb defends in relation to these three developments should not be misunderstood as 'mere eclecticism'. Rather, it involves recognition of the fact that different thinkers are not always concerned with doing the same thing. The associationists were not content to let their curiosity rest until their creative thinking had provided a central system of theory, *even if* it involved over-simplifying assumptions. Gestalt and other critics of their thought were concerned with the *different* task of providing ideas and data that served to widen such theory and remove over-simplifications. The content of the two systems might be reformulated as a preference for one of two opposing mental models that seem to have presented a fundamental dichotomy throughout the history of human thought.¹ This is well described by Whyte: 'Ever since Democritus sought understanding in *atoms* and Plato and Aristotle in *forms*, there has

response contribution is included.' It is difficult to understand how such an important or, as we could say with Hebb, *the* important tradition of psychological thought could be regarded as so bereft of productive ideas.

¹Needless to say, opposing theories tend to develop over-simplified notions about the mental models of their opponents. For example, the 'mechanistic' psychologist—believed to think exclusively in terms of nineteenth-century machines, and to be unaware that caution must be used in applying the conclusions of animal experiments to human behaviour—has become something of a stereotype.

been a vigorous competition between two sets of ideas: atomism—material analysis—quantitative precision, and form—unity—symmetry.' (1951, p. 2.) Within psychological science we may recognize the first group of mental models as those prominent in associationism, and the second group as those typical of Gestalt theory. As Whyte argues, there is some truth in the assertion that major thinkers have tended to be 'on one side or the other' in the debate between these two traditions.

We have seen that Hebb and the other psychologists cited refuse to identify scientific understanding with the mere ability to provide a mental model or theory. Evidence of such understanding may be found in the ability to provide re-exposition and *alternative* models. An individual's ability to put into other words something he has been told and claims to 'understand' is convincing evidence of his genuine understanding. Furthermore, a thinker's ability to re-expound his *own* thought, to use other mental models when asked to 'explain' what he means, is good evidence that he himself knows what he means. Degree of understanding might be defined more formally as being inversely proportional to rigidity of re-exposition. The emphasis is not, of course, on mere fluency of verbalization, but on that insightful reformulation in other terms which is convincing evidence of understanding.

In the development of a science, as we have seen, two kinds of scientific motive may sometimes come into conflict: curiosity on the one hand, and the urge to explain on the other. An investigator's curiosity may lead him to accumulate information, yet his data and his 'explanation' may be rejected as unworthy of science by colleagues who believe that nothing is 'explained' scientifically until it is related to fundamental principles and incorporated in a comprehensive system of thought. This view is sometimes accompanied by the further opinion that measurement is essential to science, and that therefore such explanation must be quantitative. Within a subject like psychology this difference of opinion is important. It is relevant, for instance, to the aims of this book and to its justification. Measurement is certainly a concern of psychology but, as Stevens has pointed out in one of the most comprehensive available accounts of the findings of scientific psychology, 'it is only remotely an aspiration in those fields of the discipline where uncharted complexity confronts the inquirer' (1951, p. 17). We must, he adds, concern ourselves first with 'the cast of the basic topography'.

We accept this view as essential to the progress of any undeveloped science. The building of a scientific discipline should not be confused—as it sometimes is—with the refinements essential to its furnishing and decoration. It is certainly the responsibility of scientific investigators to strive towards quantitative statements and fundamental comprehensive principles. Yet in this task one may encounter phenomena and problems of highly complex types, some of which may lack even accepted names. It is here that conflict may arise between investigators, or within one investigator's own personality: the conflict between scientific curiosity and the scientific urge to explain within a comprehensive system. Complex phenomena may well stimulate curiosity; among these are the phenomena of imagination, thinking, dreams, hallucinations, *déjà vu* and hypnagogic images. But these cannot be measured with the precision now possible in some other areas of psychology. Nor can they for some considerable time be properly related to fundamental principles like those in the fields of learning and motivation formulated by such modern associationists as the behaviour theorists. Precise knowledge in our present area of investigation will not be achieved in our own or in immediately succeeding generations. In the meantime curiosity seeks satisfaction, and curiosity is a motive upon which scientific pioneering must depend. However primitive, this pioneering is certainly no less important than are the more refined products of fully developed science.

In these circumstances it seems legitimate to indulge such curiosity and, if relevant information is available, to collect it and thus satisfy curiosity if only in a very tentative way. Our own concern has been mainly with observations of an approximate and qualitative, rather than a precise and quantitative kind. As one psychologist has pointed out, it is easier to measure the trivial than to arrive at a first approximation to the significant. Although some quantitative information has been reported, we have not been primarily concerned with measurement. We have attempted some accurate description and simple classification—even an occasional elementary 'naming'—in matters that seem relevant to a better understanding of imagination and thinking.¹ The attempt seems legitimate if curiosity has to some extent been satisfied; but it would not be legitimate if curiosity were, at this point, allowed to rest.

¹See Glossary of Terms p. 199.

CHAPTER XII

THE PSYCHOLOGY OF THINKING

It is probable that primitive behaviour responses of the lower and phylogenetically older parts of the central nervous system are normally dominated and repressed by the higher levels of the nervous system.—LOVETT EVANS.¹

THE purpose of this final chapter is to survey those special aspects of the psychology of thinking that have been our study, to consider their bearing on relevant neurology, and to estimate their place in the more general theory of thinking. Reference will be made to the work of some previous investigators whose ideas are central to this concluding discussion.

First, we have obviously been indebted to the long tradition in psychology that has emphasized the importance of association. Secondly, we have been much concerned with some of Freud's central ideas that accord well with this tradition—in particular his theory of the dream. Thirdly, we have sought to establish common ground between Silberer's neglected but important studies in the field of hypnagogic thinking; the view held by Rivers and others that dreaming is essentially a regressive mode of thinking; Piaget's developmental studies of thinking; and Thurstone's theory of intellectual functioning, concerned with the differences between abstract and concrete modes of thought. Fourthly, we have considered Galton's pioneer studies of human imagery and related phenomena, the *full* implications of which have hardly to this day been adequately explored in spite of reiteration of their importance by such investigators as Pear.² Fifthly and finally, considerable attention has been paid to abnormal thinking, particularly in the form it assumes in psychosis. This field has been illustrated by researches—both our own and others that have been in progress since late last century—on the experimental production of abnormal mental states which in some ways resemble psychosis.

Within this historical context, as well as that of our own

¹*Human Physiology* (1949 revision).

²See Pear 1922, 1922a, 1924, 1925, 1927, 1935, etc.

previous chapters, we turn now to a concluding examination of thinking and its psychology, under five main heads: (1) Thinking and its products; (2) Inhibition and thinking; (3) Concretization; (4) Autonomy in thinking; (5) Communication and understanding.

(1) *Thinking and its products.* Thinking is a psychological process, and for the results of this process we have used the term 'thought products'. Such thought products may be embodied in some more or less permanent form, such as a written report of a dream or a sound-recorded description of a series of hypnagogic images, in works of art or in scientific articles. Others, such as conversations, dreams, hallucinations and related imagination experiences, which are often supernaturally interpreted, are less enduring.

Important among thought products are those resulting from the interaction of A-thinking and R-thinking processes. R-thinking of the kinds denoted by such words as 'talent', 'labour', 'training', and 'skill' seems to play an important part in all permanent thought products, even in the extreme case of those 'copied' from dreams, hypnagogic images and hallucinations. Some of these thought products may be called 'social', and from them are built up science, art, philosophy, mythology and religion. Furthermore, they may be representational or otherwise. If representational, they may represent something externally perceived, as is typical of drawings made for some scientific purpose; or—at the other end of the scale—they may be representational of subjective phenomena, as in Blake's paintings of his hallucinations.

In the light of the wide individual variations emphasized by Galton it is dangerous to assume that any thought product is *not* representational; for, as we have seen, subjective experiences can assume forms that seem strange, even incredible, to those whose mental life is different. It is indeed dangerous to generalize at all in this complicated field; but if any general statement is permissible, it is that a social thought product will *tend* to be 'composite' (a) in its representational and non-representational qualities; (b) in its subjectively representational (imagination experiences) and objectively representational (perceptual) qualities; and (c) in its dependence upon both A-thinking and R-thinking.

(2) *Inhibition and thinking.* Thurstone has emphasized the inhibition by cerebral control that distinguishes 'higher' and

'more intelligent' forms of thinking from the primitive, immature and 'less intelligent' kinds. This concept of control, direction and restraint is highly relevant to the understanding of both A-thinking and R-thinking. A-thinking depends largely on mere association of ideas, without inhibition of what is (although associated) logically irrelevant and without restraint by such a principle as 'according to observation'. We should therefore describe A-thinking as characterized by relaxation of those processes of control on which R-thinking depends.

Thus sleep may be conceived of as involving regression to a level of more primitive functioning in which inhibitory control plays a minimal part; and hence the hypnagogic state, since it is transitional to sleep, also exhibits some weakened cerebral control.¹ The hypnagogic thinker copes inefficiently with abstract thought and, like the dreamer, lacks power to inhibit merely associative, in favour of logical, linkages of thought. Again, the conditions producing 'functional' psychosis, which may well be of a quite specific chemical nature,² seem to produce some similar reduction of inhibitory functions of the cerebral cortex. A sense of such loss of inhibitory control was well expressed by an intelligent psychotic who described it to the writer as 'like another self playing the fool inside me and doing all kinds of things'. To this he adds: 'My thoughts don't understand. I'm trying to stop what I call my mind "running".... I don't know how to stop my mind.' There is good reason to believe that the effects of chemical substances like mescaline, lysergic acid and adrenochrome closely resemble psychosis in this as in other respects. The alcoholically intoxicated person and the subject of nitrous oxide administration are also largely incapable of such inhibition.

¹Cameron (1947) explicitly relates both hypnagogic and hypnopompic imagery to 'cerebral incompetence'.

²Research suggests that this chemical causal agency responsible for psychosis may be 'excess of adrenochrome', 'deficiency of serotonin' or disturbance of the balance between two other antagonistic but still undiscovered substances, 'X' and 'Y'. An interesting fact about schizophrenics is their high tolerance of histamine. From this it would follow that allergies should be uncommon among schizophrenics. Lea (1955) has recently deduced a low incidence of allergy among schizophrenics from the hypothesis that adrenochrome is the substance responsible for the psychosis. This, and a second deduction from the adrenochrome hypothesis, has recently been confirmed in a study of schizophrenics by the same investigator.

When we use the word 'inhibition' we are, in terms of implied physiological processes, referring to control of lower processes by the higher centres of the brain. Relaxation of such inhibition is taken to mean something resembling what the neurologist Hughlings Jackson called 'release of function'. The principle as stated by Lovett Evans is: 'When the higher centres are removed the lower ones are released from their control.'¹ Except to define, in this general way, what is implied physiologically by our usage of words, it is not our function as psychologists to enter into details of the accompanying neurology. Nor are we obliged to choose between one theory of neurology and another. It is necessary to note, however, that neurologists also use the word 'inhibition' in another sense—a sense that derives from the work of Pavlov and refers only to areas of psychology lying outside our present subject matter.²

Nor are we considering the various neuroses. Our concern is rather with the problem of 'psychoticism', and this we would regard, like Eysenck, as *essentially different* from 'neuroticism'. Eysenck and his co-workers have presented strong evidence that psychosis is not in any way an exaggeration of neurosis. (Cf. Eysenck 1952, 1955.) They have similarly shown that introversion-extraversion (a trait that may depend on individual differences in the Pavlovian kind of inhibition) is not specially relevant to an understanding of the different kinds of psychosis. This view of the essential difference between psychosis and neurosis is consistent with our standpoint—that psychosis results from a specific chemical process, from some excess of an 'X' substance that may possibly be adrenochrome. And while a study of those qualities that a psychotic shares with the dreamer, the hypnagogic imager and the model psychotic will tell us little about neurosis,³ we

¹Evans 1949, p. 229.

²The Pavlovian kind of inhibition has now an important place in psychological theory, partly as a result of the work of the psychologist Clark L. Hull. Eysenck (1954) has since sought to explain personality differences between the two principal groups of neurotics in terms of Pavlovian inhibition.

³Here as elsewhere in nature similar effects may be produced by a different cause or combination of causes. The reduced inhibition characteristic of sleeping and hypnagogic mental life may depend principally on oxygen lack. Effects which, like certain dreaming and hypnagogic occurrences, resemble psychotic phenomena can be produced by oxygen lack experimentally induced in a decompression chamber or in some other way.

would argue that such psychological states (and their underlying physiological processes connected with 'inhibition') provide clues to understanding Eysenck's concept of 'psychoticism'.

In psychological as opposed to physiological terms 'inhibition' implies criteria of constraint other than the purely associative determinants of thought. What happens under the influence of mescaline might be accurately described as a diminution of such constraint. Mescaline, like active psychosis, seems to stimulate the fluency of A-thinking processes; the subject is not only ill-equipped to deal with reality and with logical connections, but is also dominated by fantasy and purely associative connections. In this state he may experience new insights and strange mental linkages which, if he tries to communicate them, other people cannot understand. Exciting possibilities may open up, precisely because the subject is released from what Koestler has called 'arid associative routines'; and some of these new insights may withstand verification by the R-thinking of a later day. In the same way a scientist or artist may derive fruitful subject matter when A-thinking processes are released from the constraint of inhibition, though here again R-thinking processes must operate before a socially useful thought product can result. The artist cannot dispense with the conventions of his craft, or the scientist with 'verification' by the canons of reality and logic.

Finally, it is characteristic of inhibition that it seems to provide ability to think abstractedly, or to confine thinking, as may be appropriate, to either the abstract or the concrete level. With mescaline a normally 'intelligent' subject finds himself unable to think adequately because he cannot think in a sufficiently abstract way. The proverb he is asked to explain becomes a concrete image or specific situation; a symbol, one isolated example of a variety of things it could denote. He may interpret a metaphor literally and experience highly concrete—and sometimes inappropriate—imagery in response to words, simply because he reacts to their sound rather than their meaning.

(3) *Concretization.* A-thinking is easier than R-thinking, not merely because it is unconstrained by logical connection, but also because of its tendency towards concrete rather than abstract forms. To let one's thought concretize is an important line of retreat (or 'regression') to less difficult mental functioning. This the thinking of dreams and the hypnagogic state exhibit to a marked

degree. Concretization is also typical of both psychotic and model psychotic thought. (See Chapter VII.)

Concretization may be considered as a process of diminished inhibition and may be contrasted with that 'capacity for abstraction' which Thurstone (1924) regarded as 'an inhibitory process'. One characteristic of abstract thought is the fewness of its attributes, and it is viewed by Thurstone as thought that has been inhibited at a stage remote from action. This remoteness has the advantage of permitting a wide range of specific situations in which the thought may define itself. As Thurstone remarks: 'it requires inhibition of no mean order to retain a concept as such'. It is, for example, a feat of inhibition to remain conscious of the abstract idea of 'red' without allowing this to concretize into some specific red object. An advantage of abstract principles is their application to a wide variety of specific instances; and Ernst Mach suggests that the earliest laws of science may have been time-saving formulae used by craftsmen in instructing their apprentices. (Skinner 1953, p. 14.) If scientific craftsmanship had such advantages over rule-of-thumb methods, then pure science has the added advantage of still greater abstractness; while the mathematician works at the highest possible level of abstraction and has (in an x and a y) evolved intellectual tools that are adaptable to an immense variety of uses.

At the remote extreme from the mathematician's abstract symbols lies the psychotic's marked incapacity to inhibit his tendencies to think in specific, concrete ways. Associative processes over which he lacks inhibitory control may occur and lead him to think concretely about things suggested by the sound of words spoken to him rather than by their sense.¹ Thus the subject of one mescaline experiment had great difficulty with the various meanings of the word 'spring', even though he understood that it was used in the sense of the season. As he said: 'Any word has a range of meanings, and we may choose the inappropriate meaning and associate it with another word which has a range of meaning.' Inability to control associative processes, plus tendencies to concretization, might thus lead a subject or patient from 'spring' via 'jump', 'gymnastics', 'Wooden Horse', to prison camp escapes and

¹Part of the recorded flight of ideas of a manic patient may be quoted as showing lack of such constraint: 'Good companions, J.B., Priest, good, manners, man. . . .'

the last world war. Weakening of the cortical control that ordinarily prevents irrelevant association together with excessive bias towards the concrete, may account for certain of those blockages and instances of 'knight's move thinking' that are so prevalent in psychosis.

The excessive tendencies of the psychotic and the model psychotic towards concretization increase the difficulty of communication with him. Yet the useful part that concretization plays in normal communication must not be forgotten, for even in an abstract discussion the speaker must stop from time to time and give an example. This is a legitimate and perhaps essential technique of communication. From the standpoint of inhibition the process at work is interesting; it involves giving the audience momentary rest by changing to an easier mode of intellectual functioning. There is an economy of effort of the kind needed to sustain inhibition, an economy of effort perhaps similar to that which Freud suggests may play an important part in wit. Humorous material may in fact be used by the speaker when giving concrete illustration to his abstract argument; and it is an interesting fact that laughter which occurs on such occasions—during highly abstract talks that maintain inhibition—tends often to display exaggerated intensity.

Another important form of concretization includes analogy, metaphor, and the fairly explicit use of mental models. (See Chapter V.) These too permit the audience to concretize and thus relax inhibition. Price (1953) contributes an interesting discussion of mental models as an aid to understanding the psychology of abstract thought itself. He is particularly concerned with models that illuminate aspects of the problem other than those towards which the usual models bias us. He suggests, for example, that a concept may be better thought of as a force—as a 'flow' of symbols in a specific direction—than as a 'thing'.

Concretizations supplied by the recall of specific instances and communication of thought in terms of mental models are both highly relevant to the process of understanding. Thouless states the general principle that 'anyone who makes an abstract statement should be prepared to illustrate it by a particular instance'. He adds a second principle specifically related to understanding: 'When we meet an abstract statement we should not imagine that we understand it until we can illustrate it by a particular instance.'

(Thouless 1935, p. 215.) This emphasis on concretization is a healthy one in education, at both the teacher and learner ends of the process. We have seen that the ability to reformulate any set of ideas, and the ability to criticize them relevantly are two useful criteria of understanding. (p. 114 and p. 124 above.) To these we may add this third one—the ability to illustrate and understand the abstract by thinking of an appropriate concrete example. Possession of a concept—understanding the concept—is described by Price (1953) in rather similar terms: 'The concept shows itself by putting me into a state of psycho-physical preparedness for an instance.'

(4) *Autonomy in thinking.* Interesting issues are raised by study of the operation of autonomous thought. Skinner (1938) distinguishes between responses 'elicited' by some stimulus in the external environment and those 'emitted' by the organism without observed dependence on any eliciting stimulus. Autonomous thoughts certainly give the impression of being emitted in this way rather than elicited by perceptual cues; and it may well be that certain kinds of thinking depend principally upon the internal rhythm of the organism itself. This is undoubtedly true of sensory processes such as after sensations ('after-images'). When observed with closed eyes, or open-eyed against a neutral screen, after-sensations tend to exhibit disappearance, recurrence and change. The same is true of certain more central phenomena, such as some kinds of eidetic image. In the case of mescaline images also it was noticed that the image (or hallucination) would sometimes recur after its first disappearance and perhaps reappear a third or even a fourth time later in the day, without any observable eliciting stimulus.

Yet there are other kinds of autonomous thoughts that seem to be quite definitely elicited by external stimuli; and there is the possibility that *all* autonomous thought is of this elicited rather than emitted kind. According to the Law of Association by Contiguity it follows that a stimulus A will tend to arouse B (which may be a thought, an image, an emotion, etc.) if A and B have been experienced together or in close succession. Thus, if I have heard a particular tune in a particular place, I may have auditory imagery of the music when I go there again. This law can operate in interesting, unobvious and subtle ways when the eliciting stimulus A is at the margin of attention rather than the focal point, or is perhaps

outside conscious awareness altogether. Certain autonomous thoughts seem to be elicited in this way. They appear to emerge as it were from nowhere; and they may take the form of a sudden unexpected image, a new insight or inspiration, or perhaps the missing link in the solution of a problem with which the thinker has been concerned for some time.

The following simple illustration of association operating at the margin of consciousness will show how a seemingly 'emitted' autonomous thought may prove to be in fact 'elicited'. A student reported:

I was very puzzled by an occurrence which happened two or three times. I was washing my hands in a strange house, and suddenly the memory of holidays I had spent before the war with an aunt would come to me. This happened more than once, and I finally solved it. On each occasion I had been washing my hands with a particular brand of soap with a very distinctive and pleasant smell. This soap is the kind that my aunt has always had in the house and thus I associated the smell with my aunt's house.

This instance reveals emergence of autonomous thoughts as it were out of nowhere. Yet these were found on examination to result from a stimulus that was marginal to the subject's attention. It must be remembered that at any moment of time an individual is subjected to many different sensory stimuli. To some of these his attention will be directed, others will be marginal, and others again will be subliminal—that is, available only to subconscious perception. Freud (1904) relates an incident which at first sight seemed to support the hypothesis of telepathy. The psychiatrist Brill was at dinner in a New York restaurant with his wife, to whom he suddenly remarked that he wondered how Dr. R. was getting on at Pittsburg. Brill's wife looked up in astonishment and declared that she has just been having the same thought. The explanation proved to be something other than telepathy—the fact that both Brill and his wife had subconsciously perceived a stranger who closely resembled Dr. R.

The possibility of there being an eliciting stimulus that provokes autonomous thought is one that needs to be kept in mind in any given instance. In some cases a cue which did not 'register' at the time may give rise to an autonomous thought ten minutes or so later. A psychologist colleague, for example, reported that when walking along the street she suddenly found herself thinking of a

'pink griffin' and asked herself 'what on earth put that into my head?' Then she recalled having seen a little earlier the emblem of the Phoenix Assurance Company above an office. The perception was marginal to consciousness and not really noticed at the time, though it evoked the associations leading to 'pink griffin'.

The acute insights of Holt (1931) into such processes suggest that the combination of numerous sensory cues which comprises the 'atmosphere' of a given place provides very numerous different sources of eliciting stimuli to autonomous processes. Of particular interest is how changes of mood are provoked in this way. Moreover, he suggests that the same process may be highly relevant to an understanding of the psychoanalyst's concept of emergence of ideas from the unconscious. There are various highly complex ways in which such eliciting cues may operate. Among these we may mention associative linkages of a synaesthetic kind. (Cf. Chapter IV.) Thus Raymond Postgate (1951), writing of Tokay, confesses that he finds the bouquet and flavour of this famous wine 'in some way green'. His linkage is apparently through images of a green landscape which seem to come to him naturally when he drinks Tokay. Mr. Postgate would himself have insight into his connection, but—to indulge in a flight of fantasy for a moment—someone unaware of Mr. Postgate's synaesthetic imagery might find the changed direction of the after-dinner conversation towards say, the appearance of fresh green shoots in spring, strangely 'autonomous' and seemingly not elicited by any stimulus. No one would suspect the Tokay of being responsible any more than the soap in the case of the student already quoted. Even quite everyday instances of autonomous thinking may have explanations of this kind.

When we turn to the psychotic's autonomous processes and 'knight's move thinking' still more complex processes may operate. Unexplained and unpredictable moods may well be explicable as elicited and not emitted phenomena. Thus a stimulus A (which is perceived as a subliminal cue) may evoke a thought, B, because both (or B alone) are linked to an emotional state, C. We have seen that some subjects experience synaesthesia, or resort to synaesthetic thinking, about pain. If a psychotic who experiences such synaesthesia suddenly becomes angry for no apparent reason, an explanation may be along these lines: a mild twinge of pain is felt—pain—a 'green' kind of pain—colour in general—brown—

Mr. Brown who is a disliked person—anger emotion. Such an explanation may seem far-fetched, yet those who have talked at any length with disturbed schizophrenic patients will not need convincing how strange, bizarre and private are the linkages of their thought.¹ Hallucination, together with neologistic and synaesthetic linkages, perhaps elicited by subliminal stimuli, may explain some of the complex and highly autonomous phenomena of human thought.

Association may, alternatively, occur through similarity rather than through continuity, and this further enriches the possibilities of associative linkage. Similarity is not an all-or-nothing quality, but a matter of degree. The work of Pavlov on conditioning and of Hull on generalization has shown that the likelihood that *stimulus 2* will evoke a response formerly evoked by *stimulus 1* is proportionate to its resemblance to *stimulus 1*. Furthermore, outside the field of such rigorously controlled experimentation 'resemblance' may be a highly subjective matter, noticeable to one individual and not to another. There are thus many ways in which certain autonomous processes might after all be elicited by environmental stimulation.² Yet the possibility that some autonomous processes are of this other, emitted kind is one which cannot safely be rejected. Our principal concern, while allowing for this possibility, has been with unobvious and complex possibilities of eliciting stimulation. The work of Holt (1931) in particular, deserves reconsideration by those who would gain fuller understanding of these subtle but interesting phenomena of both thought and emotion.

(5) *Communication and understanding.* In this book we have been concerned to some extent with the communication of thought as well as with thinking itself. Of particular interest is the problem of communicating what is intrinsically difficult to communicate; and without doubt an awareness of this difficulty—together with the exploration of new idioms of communication—has played an important part in the development of art as well as language.

¹These illustrations should not be taken as implying exclusion of the possibility of dissociated emotion—discussed elsewhere—which may provide the appropriate explanation on other occasions (see p. 94).

²In the technical terminology contributed by Skinner (1938), these would be 'operant' (emitted) rather than 'respondent' (elicited) occurrences in the field of thought, imagery, emotion, etc.

There are things which are easy to communicate, just as there are things which it is easy to explain, but some thinkers prefer more pioneering activities in both fields. Frye (1947) draws attention to the insistence of artists that 'the totality of experience is far greater than all attempts to summarize it in a formula'. Blake as an artist and thinker would have found this thought highly congenial. To refer again to Hebb's dichotomy between two different (and both necessary) kinds of scientific thinkers (see p. 178), we may say that some individuals are less interested in presenting a necessarily simplified theory to help explanation than in drawing attention to the complexity of natural phenomena, and thus correcting the tendency of such theory towards over-simplification. Among psychologists William James was an outstanding example of such a thinker.

The problem of communication is inseparable from that of understanding; and the relationship between grasping an easily intelligible theory, and breaking down the resultant over-simplification, is basic to adequate understanding. Thus someone who has learned up a subject from an elementary textbook must break down his earlier ways of thinking as he advances to a more advanced understanding of the subject. The same relationship is illustrated in the way book learning is broken down and enriched by practical experience; and conversely by the 'practical man's' achievement when he settles down to learn the basic principles of his craft. It is difficult to define objectively the word 'adequate' as qualifying understanding, but it seems to include such components as richness of associative interconnections; ability to reformulate what one 'knows' in alternative terms; and ability to use it in one's own thought and actions. And perhaps also an emotional attitude involving a kind of intellectual humility—a concern with probabilities rather than certainty, and an awareness that problems get more complex rather than less complex the more one knows about them. It may well be that seminars and discussions have their advantages as educational techniques over passive listening to talks and lectures, because they provide opportunities for interaction between different individuals' favoured models and imagery parochialisms. Once again, our emphasis is on the intellectual virtue that Reik calls 'the courage not to understand'.

This is not a defence either of the attitude that Fenichel has called 'neurotic doubt' or of 'destructive criticism'. There is a

considerable difference between criticism relentlessly directed towards a solution of the problem in hand, and that which is indulged in merely for its own sake. There are also people who react to their own constructive ideas with a kind of destructive criticism—the attitude condemned by Schiller as unlikely to lead to the production of artistic thought products. (See p. 132, above.) We might add that it seems equally unlikely to lead to *scientific* thought products—or any others of a useful kind.

The resemblance between the act of private thinking and the act of communication throws light on certain forms of failure to communicate. Synaesthetic descriptions may, as we have seen, be helpful in communication, whereas personal synaesthetic idiom (though often useful in private thinking) may give rise to failure to communicate. (See Chapter IV.) Any personal idiom or parochialism in an individual's ways of thinking may, like synaesthesia, impede communication. He may attribute to everybody one of the atypical imagination experiences he himself happens to have. Alternatively, he may be completely unable to understand number forms, colour associations, or some other phenomenon he does not happen to share with someone who is trying to communicate it to him. The investigator of such phenomena as hypnagogic imagery soon comes to distinguish two types of people: those who readily grasp what he means by a 'hypnagogic image', and those who cannot understand at all what it is like. These two groups correspond roughly (and naturally!) to those who have the imagery and those who lack it. We have tried in this book to communicate the nature of various imagination experiences, in the hope that this may increase tolerance of other forms of mental life and thus lead to greater understanding of mental abnormality.

The family joke has been mentioned in its relevance to communication. (See Chapter VI.) Many ideas and allusions mean little or nothing to those outside a small group, and others are of use only to an individual's private thought. The inappropriate use of either type of ideas in communication presents interesting problems central to the question of the actual process of communication. In conveying information to an audience one attempts to choose models and allusions that are within that audience's field of knowledge. So far as art is a social phenomenon, it is much concerned with using matter, or symbols representing matter, as a basis of communication. Alternatively, the artist's aim may be

less to communicate ideas than to evoke in his audience subjective experiences similar to his own. Such experiences may be visual, emotional or of some other kind. As we have seen, art is sometimes most 'successful', in the sense of having widespread and enduring appeal, when it evokes a personal imaginative activity in the beholder.

Attempts to communicate mystical experiences tend, on the whole, to be unsuccessful. It is interesting that William James (1902), who was conspicuously insightful in this field, concludes that mystical experiences are intrinsically incommunicable—that they must be directly experienced. There are certain similarities between the mystic's problems of communication and those of the artist, especially the type of artist whose work may readily be 'misunderstood'. In certain respects scientific communication represents the opposite end of the scale from mystical communication. There are, of course, difficulties arising from a technical vocabulary; but such words usually have fairly clearly defined usages which can be found in appropriate technical books and scientific dictionaries. The communication of a scientific experiment in a research paper well illustrates the communicability of science and its difference in this respect from mystical experience. The ideal is for the experimenter to communicate what he has done in such detail that any member of his audience who may question his results can repeat his experiment, and in nearly as identical a way as possible. It is suggested that this type of communication is an impressive achievement of reality-orientated human thinking.

THINKING AND HUMAN LIVING

It has been our contention that socially useful thought products, such as those that make up art and science result from the interaction of A-thinking and R-thinking. A-thinking without any accompaniment of R-thinking has greatly misled man in his problems of adjustment to reality, and still continues to mislead him. Human society remains very much dominated by the influence of superstition, inaccurate stereotypes, indifferent art, and inadequate substitutes for scientific knowledge. Communication between ordinary men and those who govern them, and between those who inhabit different parts of the earth's surface, tends to be highly

inefficient, and the resulting forms of thought are often rigidly stereotyped. Furthermore, there remains an excessive time lag between scientific research and its application to human living. This time lag involves other problems besides those of communication; for there is no simple relation between communication of information and *acting differently* on the basis of such information. Much scientific research remains to be done, but there are probably few fields of inquiry where we could not find scientists frustrated because the fruits of their own or their colleagues' research, although already available, are not being applied.

Many strong barriers have been set up against the application of tested human knowledge to the chaotic problems of human living. This is particularly true in the case of the behavioural sciences such as psychology, sociology and social anthropology. It is concerning these that we hear so much about the alleged 'limitations of science' from tiresome people who have some vested emotional interest in excluding realistic inquiry from one or other field of human affairs.

Prominent among such barriers are stereotyped clichés, which give a comfortable feeling and save the effort of further thought. A familiar instance is the saying that 'you can prove anything by statistics'. (As the late Sir Godfrey Thomson once remarked of this particular bulwark of irrationality: 'Maybe, but you certainly can't prove anything *without* them!') Another stereotyped attitude holds up the uninformed amateur as 'entitled to his opinion' on a specialized matter, and goes so far as to extol this opinion as something towards which the *well*-informed should be 'open-minded'. For it is a curious and interesting feature of human thought that informed opinion tends to humility and caution, while ignorance so often resorts to that childhood form of proof, 'I know'. Another general assumption that handicaps the advance of science is in direct opposition to this childish sense of certainty—a contradiction that prevents no amateur from maintaining both of them at once. This is the conviction that there is some kind of intellectual virtue in holding the idea that 'we can never know' the truth about this or that. It is difficult to understand how this tenet of gratuitous dogmatism could ever come to be accepted as having moral worth.

One of the greatest barriers to more adequate adjustment to reality is the unyielding conviction that adults cannot learn.

This view is advanced (like the clichés we have quoted) most often by those whose thought is immature, and who themselves stopped learning long ago. We may agree that it is difficult to alter adult behaviour, and that adult learning (compared with that of childhood) is inefficient, slow and limited. Yet if adults do not learn, at least a little, then children tend to be moulded by established and often obsolescent attitudes; and the chains or rigidities of office will continue to close about younger men as they succeed older men in positions of power and influence. The future is gloomy indeed if adults cannot, or will not, learn *a little*.

Other types of assumption have been questioned in the course of our analysis, including the assumption that what people see or otherwise perceive is necessarily really there. After making an examination of hallucinations one becomes more cautious about evidence, even 'the evidence of one's own eyes'. As investigators have shown repeatedly, otherwise *normal* individuals can experience hallucination; and if we include the altered mental states adjacent to sleep, then quasi-hallucinations are remarkably common.

In conclusion, we would suggest that more research is needed into this crucial problem: how to change human behaviour according to the findings of science. Perhaps an Institute might be founded, devoted to the enterprise of minimizing waste of scientific research. Its task would be to investigate how thinking can be better geared to fact than to fantasy, and to making the fullest use of the fruits of realistic human inquiry. One suitable subject in the field of psychology would be how to break down the stereotypes and prejudices held (even by intelligent, humane and highly educated people) about the inmates of mental hospitals. A major aim of this book has been to draw attention to the fact that the psychotic patient, although ill, remains a human being; and that he is (by contrast with prevailing stereotypes) remarkably like the sane in many important respects.

To adjust action according to the findings of the most sensitive instruments man has devised for exploring the reality of nature and human nature—this remains a problem. It is one with which human thought and imagination must continue to struggle.

GLOSSARY OF TERMS USED

IN the absence of established terminology, it has been necessary to supply names for certain of the phenomena discussed. As far as possible, existing terms have been employed, and in cases of doubt the usage of Warren's *Dictionary of Psychology* has been followed.

ADRENOCHROME. Chemical substance which occurs normally in the human body as a result of chemical changes to adrenaline. Adrenochrome resembles mescaline (q.v.) and lysergic acid diethylamide (q.v.) in the hallucinations and other psychotic phenomena it produces, and the theory has been advanced that schizophrenia in particular or psychosis in general results from excess of adrenochrome or some closely related substance.

AFTER SENSATIONS. (After images.) Prolongation or renewal of a sensory experience after the stimulus has been removed. (The term 'sensation' is preferable to the term 'image' since the experience is principally connected with the sense organ itself, not the brain.)

ALGESIC. Relating to the pain sense.

AMNESIA. Loss of memory.

A-THINKING. Autistic thinking: thinking which is dominated by processes of the fantasy kind, rather than geared to reality, e.g. hallucination, hypnagogic imagery, etc. (Contrast R-thinking.)

AURA. A subjective phenomenon, often taking the form of a specific kind of visual or other hallucination, that precedes a nervous attack; usually aura are associated with epilepsy.

AUTONOMOUS. Occurring of its own accord and independently of voluntary control; e.g. hypnagogic images (q.v.) are strongly autonomous.

AUTONOMOUS IMAGERY. (Contrast 'controlled imagery'.) Imagery over whose occurrence and content the subject lacks any power of control.

BLOCKAGE. The term is here used to apply to the quasi-pathological inability to communicate that occur in psychosis and model psychosis. Blockage may result from suspiciousness, pre-occupation with irrelevant side issues, inability to remember words, and a wide variety of other subjective conditions.

BODY SCHEMA. Awareness of one's own body as an object in space composed of spatially related parts (Head and Holmes). The body schema may become distorted or exhibit size change, hypnagogically, in model psychoses, etc.

CATATONIA. A form of schizophrenic psychotic reaction, characterized by a variety of motor disorders, e.g. catatonic stupor, waxy flexibility of the limbs, sudden impulsive behaviour, etc. Catatonic

reactions may be produced in the state of hypnosis, and can also occur in model psychoses experiments.

CLAIRVOYANCE. Alleged paranormal ability to see without use of the eyes, e.g. to read a book which is in another room.

COLOUR ASSOCIATION. Tendency to associate colours with, for example, days of the week, months of the year, the seasons, etc. These associations are of a regular kind and may occur by way of vivid images of the colours concerned.

CONCRETIZATION. Tendency to think of an abstract idea by a concrete pictorial representation. Blockage (q.v.) may occur; e.g. model psychosis subjects may be unable to explain proverbs because concrete images intrude and preoccupy attention. Concretization also seems to play an important part in the thought processes of the dreaming and hypnagogic states.

CONTROLLED IMAGES. (Contrast autonomous images, q.v.) Images over whose occurrence and content the imager is able to exert voluntary control, e.g. can change or stop the imagery.

CRYSTAL IMAGES. Visual images with a vivid eidetic-like quality which some individuals experience on gazing into a crystal ball (or other specific means, e.g. a mirror, may be used).

DATE FORMS. A kind of diagram form (q.v.) in which there is a regular tendency to image days of the week, months of the year, etc., as spatially arranged.

DÉJÀ VU. The experience of feeling 'I have been here before' or 'I have lived through this before', together with intellectual awareness that this is not so. *Déjà vu* experiences have sometimes been interpreted in terms of reincarnation.

DELUSION. A belief which runs counter to R-thinking, exhibiting pathological features and usually associated with psychosis, e.g. delusions of persecution, delusions of bodily change, etc.

DIAGRAM FORM. A general term suggested by Pear to include number forms (q.v.) date forms (q.v.), etc. as special cases. It applies to a regular tendency to image numbers, dates, etc., as arranged in space.

DISSOCIATED EMOTION. Upsurges of autonomous emotion which seem to be 'emitted' by the personality rather than provoked by external circumstances (e.g. the subject may be frightened and unable to associate the fear with any particular cause).

EIDETIC IMAGE. A mental image with perceptual-like qualities, characterized by extreme vividness (and sometimes by long duration). Theoretically, eidetic images may be of any sense mode, though the work of the Jaensch brothers and most subsequent investigation has centred on visual eidetic imagery. The imagery is relatively common in children though rare in adults, and shades into hallucination (q.v.).

EMPATHY. Imaginatively placing oneself in the shoes of another person in such a way as permits sympathetic understanding of his mental life. One can, however, empathize without necessarily experiencing

sympathy for the other person; empathy involves understanding rather than 'siding with'.

FALLING EXPERIENCE. The hypnagogic (q.v.) experience of 'falling and waking up with a jerk'.

FUNCTIONAL PSYCHOSIS. A psychosis (q.v.) which lacks a known physical cause, e.g. schizophrenia (q.v.).

HALF-BELIEF. A reaction exhibiting some of the features of belief, together with some of those of disbelief. Half-belief is compatible with intellectual rejection of the viewpoint in question; for example, some people half-believe superstitions whose truth they would deny.

HALLUCINATION. A false perception which the subject himself readily confuses with perceptions of real objects, although it is grossly at variance with actual sense data. Hallucinations, like illusions, may relate to any sense mode, but differ from illusions in being personal to a given individual rather than experienced in the same way by different observers. (Cf. Eidetic Image and Hypnagogic Image.)

HUE. The colour of a stimulus; red and pink, for example, are of the same hue, and both differ in this quality of hue from green or yellow.

HYPNAGOGIC. The half awake state which *precedes* sleep. Body schema (q.v.) distortions, imagery of extreme vividness and having other distinctive qualities, quasi-hallucinations, and other interesting phenomena occur to some individuals in this waking-sleeping state.

HYPNAGOGIC IMAGE. Imagery of any sense mode, of a strongly autonomous kind and sometimes of almost hallucinatory vividness occurring in the drowsy state prior to sleep. (Cf. Warren 1934.)

HYPNOPOMPIC. The state which follows sleep and precedes return to full wakefulness. (Compare and contrast the hypnagogic state, several of whose phenomena can also occur hypnopomically.)

HYPNOPOMPIC IMAGE. See hypnagogic images. Hypnopompic images differ in that they occur during the waking up rather than falling asleep process.

IMAGE. An experience which reproduces or copies in part, and with some degree of sensory realism, a previous perceptual experience in the absence of the original sensory stimulation. (Cf. Warren 1934.) The term is used in the psychologist's sense and not, as sometimes used in literature, to mean allusions, metaphors, etc., e.g. 'the images of Shakespeare'.

IMAGERY ASSOCIATIONS. The term is used to denote the (unnamed) phenomena to which certain people are subject, of specific images of a regular kind rather rigidly associated with days of the week, months of the year, certain words, etc.

IMAGINATION. The process of producing and communicating thought products which differ markedly in their form and/or content from their perceptual origins. The term is also used here more loosely as a synonym for fantasy.

IMAGINATION EXPERIENCES. The term is used to denote subjective phenomena in general (hypnagogic imagery, dreams, hallucinations, body schema distortions, etc.), including experiences which the subject undergoes in fantasy rather than in fact. For example, 'I dreamed that I was ...'

IMAGINATION IMAGE. (Contrast memory image.) An image whose form and content differs markedly from what the subject has seen or otherwise perceived.

INADEQUATE STIMULUS. A stimulus which, though of an inappropriate kind, activates a sense organ. The relevant principle is that the resulting experience takes its character from the sense organ stimulated—thus a blow to the face may act as an inadequate stimulus to vision and cause the subject to 'see stars'; a tactile stimulus applied to a hot or cold receptor organ on the skin surface may evoke the experience of 'heat' or 'cold'.

INCUBATION. The passage of time, or changed activity, held by Wallas and others to favour creative thinking.

INHIBITION. The process of restraint (?) by the higher brain processes) which, it is argued, is of central relevance to R-thinking. It is suggested that inhibition of ideas which are merely associatively connected, and of tendencies to concretization, is necessary to adequate reasoning and logical discussion. It is further suggested that A-thinking in general (dreaming, hypnagogic imaging, hallucinatory, prejudice-governed thinking, etc.) can best be thought of as resulting from relaxed inhibition.

JOST'S LAW. (1) Older learning is less readily forgotten than more recent learning, granted equal strength of learning. (2) Other things being equal, further practice increases the strength of older learning more than it will increase the strength of recent learning.

KINAESTHETIC. Perceptions of the movement of the body and its members, arising from stimulation of special receptor organs in the joints, tendons, etc.

KNIGHT'S MOVE THINKING. Strange connections, or seeming absence of connections, occurring in psychotic and model psychotic thought, and particularly associated with schizophrenia (q.v.). ('The knight's move of the schizophrenic.')

LOSS OF THE 'AS IF'. Confusion of thinking resulting from loss of the ability to distinguish between the ideas 'It is as if X were so' and 'X is so'.

LUMINOUS DUST. (*Eigenlicht*, idio-retinal sensation, etc.) The patterns, shapes and/or colours which are prominent with closed eyes in a darkened room. Their prominence can be increased by the inadequate stimulus (q.v.) of eyeball pressure, chemical stimulation (e.g. mescaline, alcohol), etc.

LYSERGIC ACID DIETHYLAMIDE. A substance derived from ergot which, if administered even in very small quantities, produces psychotic-like experiences (model psychoses).

MEMORY IMAGE. A mental image which approximates closely to the original percept, and to the real object or situation to which this relates.

MENTAL ATAXIA. Marked disturbance of co-ordination as between what one communicates and what one intends to communicate, e.g. in speech or in writing.

MENTAL MODEL. A more explicit or more implicit analogy (simile or metaphor) applied to other subject matter for the purposes of thought or communication. (For example, simile type: the mind is like an iceberg—the major part of it being beneath the surface, i.e. unconscious.)

MESCALINE. A substance used experimentally to produce psychotic-like phenomena—originally derived from a plant, now usually prepared synthetically. (Compare lysergic acid diethylamide.)

MODEL PSYCHOSES. Experimentally produced abnormal mental states which resemble psychosis, produced by such substances as mescaline, lysergic acid, adrenochrome, etc.

NUMBER FORMS. Diagram forms (q.v.) involving a regular tendency to image numbers in some spatial arrangement.

OLFACtORY. Relating to the sense of smell.

OVERLEARNING. Learning which results from repetition carried beyond the point necessary to achieve perfect performance (or perfect recall).

PERSEVERATION. The tendency for a psychological process to recur, or to continue, without voluntary control and even in spite of voluntary control (e.g. a tune of which a person says: 'I can't get it out of my head').

PHYLOGENESIS. Origin and evolution of the species (as opposed to ontogenesis: an individual's development during his own life history).

PRECOGNITION. Alleged paranormal ability to be able to foresee the future. For example, ability to read the headlines of a newspaper a month ahead would be an instance of precognition.

PRESQUE VU. The impression of almost, but not quite, having grasped a truth which seems important—sometimes associated with mystical experience.

PRIMARY PERCEPTION. Contrast secondary perception (q.v.). Perception of the object or situation itself, rather than (as in secondary perception) perception of it through some intermediary (e.g. picture, recording, representation, spoken or written description, etc.).

PRINCIPLE OF ECONOMY. Tendency to make use of what sense data is in fact *there*. Examples would be developing delusions of persecution about someone who is, in fact, hostile; hallucinating something around visual or other sense data already there; constructing auditory hallucinations of voices out of the sounds of one's own breathing.

PSYCHOANALYSIS. Applies to the system of thought and method of psychotherapy, deriving from Freud. The terms 'psychoanalysis'

and 'psychoanalyst' imply orthodox Freudian doctrine (as opposed to 'analysis' and 'analyst'). A psychoanalyst is a person (usually medically qualified) who has been properly trained in this system of theory and method of therapy. The term 'analyst' is more loosely used to apply to therapists who use methods broadly deriving from Freud's work, but are not trained according to the theories and standards accepted by the Institute of Psychoanalysis.

PSYCHOSIS. Severe mental illness usually requiring in-patient hospital care. (Contrast neurosis, where out-patient treatment may be sufficient.) The notion of psychosis (as opposed to neurosis) involving 'loss of insight' has become something of a stereotype. It is our thesis that schizophrenia and the other principal functional psychoses result from biochemical changes—perhaps an excess of some 'X' substance chemically similar to mescaline, lysergic acid, adrenochrome and other model psychosis-producing substances.

REMEMBERING: REPEATED REPRODUCTION. Experiment in which the subject reproduces some story or message, at successive intervals, in order to demonstrate the distortions which occur as a result of the passage of time.

REMEMBERING: SERIAL REPRODUCTION. Experiment in which some story or message is communicated from one member of a group to another, in order to demonstrate the distortions which occur because of this process of social transmission.

R-THINKING. Thinking constrained by concern with observable facts, and characterized by connections of a logical (rather than merely associative) kind, e.g. scientific thinking and logical reasoning. (Contrast A-thinking.)

SATURATION. The amount of colour present. A bleached colour might be described as de-saturated. To illustrate, a strong red (e.g. pillar-box, guardsman, etc.) is more saturated than a pink, which is produced by desaturating red by addition of white.

SCHIZOPHRENIA. A common form of psychosis, characterized by dominance of fantasy life, including hallucinations and loss of contact with external reality.

SECONDARY PERCEPTION. Contrast primary perception (q.v.). Perception of an object or situation through some intermediary (e.g. a picture of it, a description of it, a model of it).

SUBCONSCIOUS PERCEPTION. Perception which occurs beyond the threshold of conscious awareness, and without knowledge of the fact that one had perceived.

SUBJECT. Term commonly used in psychology to denote the individual whose behaviour forms the subject matter of the inquiry. (Contrast 'experimenter'.)

SUBLIMINAL SENSORY CUES. Stimuli which 'pass through' the central nervous system and accelerate or retard motor processes without entering consciousness (Holt).

SYNAESTHESIA. Phenomenon in which a stimulus presented in one sense mode seems to call up imagery of another sense mode as readily as that of its own (M. D. Vernon).

SYNAESTHESIA TYPES. Types of synaesthesia are denoted by two words, the first always denoting the imagery component, and the second always denoting the sensory component, e.g. 'visual-auditory synaesthesia'—the commonest type (Simpson and McKellar).

SYNAESTHETIC DESCRIPTION. Description of experiences belonging to one sense mode in language appropriate to another sense mode, e.g. 'a green pain' (E. D. Fraser).

TELEPATHY. The alleged communication of ideas etc. from one 'mind' to another, supposedly without the intervention of the sense organs.

THERMAL IMAGERY. The term is used to denote imagery for *both* heat and cold.

THOUGHT PRODUCTS. The fruits of the process of thinking, which may be short-lived (e.g. spoken words) or of a more enduring kind (e.g. a scientific paper or a painting). The term is used widely, it being implied that much of what Freud said about two kinds of thought product (the dream and the waking fantasy) applies to *all* thought products.

TIME DISCONTINUITIES. Brief periods of amnesia (q.v.) or of loss of consciousness, which give rise to the impression of seemingly unexplained events (since events leading up to them occurred during these blank periods). It is suggested that the time discontinuity phenomenon may have relevance to the understanding of certain kinds of delusion.

UNCONSCIOUS PLAGIARISM. Use of the ideas of some other person without insight into the fact that plagiarism has occurred.

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